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MANCHOUKUO AND THE REPUBLIC OF CHINA —SOME COMPARISONS

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RUSSIA'S ARCTIC EMPIRE IN THE NEXT WAR

Vol. XXXIV AUGUST, 1938 No. 8

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ENGINEERING FINANCE COMMERCE

VOL. XXXIV SHANGHAI, AUGUST, 1938 No. 8

Manchoukuo and the Republic of China—Some Comparisons

SIGNIFICANT parallels may be seen in a comparison of the blasts of world-wide publicity loosed back in 1932-33 with present-day outpourings in articles, lectures and broadcasts regarding Japan and Japanese destiny. At the time that the new State of Manchoukuo came into being under Japanese sponsorship, in 1932, public opinion in the Occident, moulded by a "Lytton report," that is forgotten, and by acts of a League of Nations, now moribund, had crystallized. Under these influences the consensus of belief in the Occidental world was that Manchuria in its new rôle as Manchoukuo presently would be reduced to chaos and that Japan was headed straight for national bankruptcy and disintegration. The Occidental world believed sincerely that these things would come to pass because their writers and their spokesmen told them so, even as the same writers and spokesmen to-day are writing and talking about the situation in China.

Remembering these widely accepted prognostications of coming calamities that were made so glibly in 1932 and 1933, it may be interesting, if not instructive, to glance over the actual record of the years since the birth of Manchoukuo. To apprehend better the existing situation in China an examination of the brief history of Manchoukuo may be helpful.

Some of the Changes

A traveler acquainted with Manchuria as it was under the rule of the Changs, before the year of 1932, would encounter vastly changed conditions on a visit to the country to-day. In the realm of Manchoukuo he would find one government instead of four; one system of laws where before there were none; one system of stable currency where formerly many currencies, none stable, some worthless, and all dubious, circulated. He would find also one system of moderate taxation where formerly in lieu of any system of taxation a great population was reduced to serfdom by methods approximating confiscation. In those days of misrule in this vast granary of the North the Manchurian farmer, with an avid world market for his products, could sell these products of his toil to only a single purchaser, and at prices fixed by that purchaser. Squeezed in the first instance by the landlord owner of the soil, he could sell his products only to officials of the ruling regime through their own banks. These officials paid for farm products in one or the other of the various currencies of the country, currencies often of no worth and never attaining face value. The officials readily sold these Manchurian products for gold currencies in foreign markets closed by law to the Manchurian farmer. Thus the Changs, the "Old Marshal," Chang Tso-lin, and his son, the "Young Marshal," waxed mighty in wealth and power. This system that existed in Manchuria, with slight changes in methods, and also with less severity, is not greatly different from conditions that prevailed throughout rural China up to the time that hostilities brought a pause to agricultural activities in general in China.

The essential changes that have transformed Manchuria have been wrought in the years since 1932 when the State of Manchoukuo was established. Japan, San Salvador and Italy have granted recognition to the new State of Manchoukuo. All the other nations of the world have held aloof, ignoring the existence of this Empire that sprawls over more than 460,000 square miles of the earth's surface with its population of thirty-odd millions. By virtue of the Rome-Berlin-Tokyo agreement the aid of Germany is enlisted in co-operative progress with Japan and Italy in strong political and economic relationship, and these Powers are all the more united in their mutual alliance against Russian Communism. Those Powers that have not accorded recognition to Manchoukuo cling to the centuries-old fallacy that Manchuria is a part of China. Through the centuries after the Manchus had conquered China their homeland in Manchuria remained an independent preserve, closed to the Chinese. After the overthrow of the Manchus in 1911 the territory of Manchuria under the iron rule of the Changs remained independent. The Old Marshal, Chang Tso-lin emphasized this from time to time in Declarations of Independence and toward the end of his life he even dreamed of overthrowing all of the many warring factions within China proper with the intention of founding a new dynasty. Through only the brief space, from 1929 when the Young Marshal raised the Kuomintang flag in Mukden until the Autumn of 1931 when the "Manchurian Incident" occurred was any sign given in Manchuria acknowledging supremacy of the Nanking Nationalist Government, and this act of Chang Hsueh-liang together with all the acts and works of the Chang regime were repudiated when the State of Manchoukuo was founded. Not a single official of the Nanking Nationalist Government ever functioned in the territory that was Manchuria. It is true that the Overseas Powers that now deny recognition to Manchoukuo in dealing with Manchuria in former days did so through Peking or Nanking, usually vainly. Only Russia and Japan with clearer understanding of the realities of the situation dealt directly with the Overlords of Manchuria.

The Bid for Recognition

In 1932 when Manchoukuo was established one of the first acts of the new Government was to address notifications to all the world powers proclaiming independence and asking for recognition. The pledge was given in these notifications that in return for what was asked foreign rights under treaties with China would be respected, loan commitments of foreign interests would be safeguarded, the "Open Door" policy would be maintained in the New State, and other concessions would be made. With the exceptions of Japan and San Salvador, all the world powers ignored the notifications from the New State. When Japan's exports to Manchoukuo skyrocketed a number of overseas powers, notably the United States and Great Britain, addressed complaints to Japan charging that the New State of Manchoukuo was refusing to maintain the "Open Door" policy. When Japan referred these complaints to Manchoukuo the new State believed itself justified in ignoring them. Unofficially, Manchoukuo then said something to this effect: "You ignored us when we sought to be friendly, and you continue to ignore us; yet you expect favor from us. Recognize us as a State; if not, then take your complaints to Chiang Kai-shek at Nanking."

Manchoukuo's exports have been going mainly to Japan, China and Germany and she in turn buys many products from these countries. This does not mean, however, that other foreign manufacturers are not selling goods to Manchoukuo. It is true that the days of the foreign middle-men, the so-called "white agents," representing foreign manufacturing concerns, are nearing an end; this has caused many bitter complaints from individual business interests in the Far East and abroad. Trade policies in the New State have changed and foreign commercial interests now either deal directly with the Government of Manchoukuo or sell their products through Japanese and Manchu agents, who are citizens of Manchoukuo. While individual foreign interests have suffered, the major national trade currents have been altered but little. Foreign goods have been finding and are continuing to find profitable markets in Manchoukuo. The official Customs Returns of the Foreign Trade of Manchoukuo tell an interesting story—as follows:

Countries	*1936*		
	Exports	*Imports*	*Total*
Japan	237,508,643	507,324,215	744,832,858
Korea	48,394,720	27,306,862	75,700,582
China	128,602,736	47,684,840	176,287,576
Russia	1,585,036	260,927	1,845,963
Hongkong	8,732,478	4,947,335	13,679,813
British India	1,691,465	28,223,884	29,915,349
Netherlands India	1,477,642	6,858,886	8,336,528
Great Britain	27,520,818	7,419,198	34,940,016
France	4,837,346	788,710	5,626,056
Germany	50,273,099	13,024,510	63,302,609
Belgium	953,180	1,019,219	1,972,399
Netherlands	7,071,648	631,282	7,702,930
Italy	382,792	1,624,287	2,007,079
U.S. of America	16,352,551	23,735,307	40,087,858
Other Countries	67,369,835	20,981,850	88,351,685
Total From January	602,758,989	691,830,312	1,294,589,301

Countries	*1937*		
	Exports	*Imports*	*Total*
Japan	277,087,993	627,229,748	904,317,741
Korea	44,423,413	39,040,096	83,463,509
China	113,752,939	39,323,670	153,076,609
Russia	145,660	701,314	846,974
Hongkong	8,416,585	4,410,534	12,827,119
British India	132,239	45,623,586	45,755,825
Netherlands India	1,265,042	8,948,086	10,213,128
Great Britain	9,322,395	11,128,272	20,450,667
France	1,268,235	3,366,611	4,634,846
Germany	59,051,645	17,278,160	76,329,805
Belgium	1,272,904	3,992,696	5,265,600
Netherlands	16,570,020	1,527,292	18,097,312
Italy	2,644,028	1,063,783	3,707,811
U.S. of America	18,673,846	57,523,126	76,196,972
Other Countries	91,270,712	26,254,722	117,525,434
Total From January	645,297,656	887,411,696	1,532,709,352

Figures that are Eloquent

These figures above speak for themselves. All countries, excepting Italy, have increased their export trade to Manchoukuo, if comparison is made with the year 1936. Hongkong's trade with the new State has remained stationary. It is of special interest to note, keeping in mind the many complaints of the "lost rich market" in Manchuria, that *American sales to Manchoukuo in the year 1937 totalled Y.57,526,126, which is the highest total attained since the United States first began trading with Manchuria.* It surpasses even the totals reached through the years when Marshal Chang Tso-lin and his son, Chang Hsueh-liang reigned as Overlords of Manchuria. It exceeds even the former peak year of 1929, when American exports to Manchuria were Y.37,540,500.

The British-owned *Japan Chronicle* of Kobe, noted for its outspoken editorial criticisms of many Japanese activities, in its issue of May 29, 1938, had this comment to make regarding American trade with Manchoukuo:—

> "American public opinion does not seem to have made up its mind whether the door in Manchoukuo is open or not, but figures quoted by the *Far Eastern Survey* show quite a boom in American trade, an export expansion which began in 1937 and has continued into 1938. Nor is it in war supplies that the new trade is being done though the hostilities in China, must, of course, have affected the trend to some extent. At all events in 1937 American exports to Manchuria totalled $16,100,000, nearly five million dollars higher than the peak year of 1929 and a gain of 353 per cent over 1936. The figure is of trade passing through Kwantung; it does not include indirect exports via Japan. American imports from Manchoukuo, on the other hand, dropped to a mere $3,300,000. A surprise item in the exports list is $1,200000 worth of cotton."

It is seen that those countries that have refused recognition to Manchoukuo and which have made the loudest complaints, charging that Manchoukuo has shut the "Open Door" to foreign trade, are the very countries whose export trade with the new State has risen to new high records. Can it be wondered that as Manchoukuo continues to progress and expand, finding new friends among the nations of the world that, as far as trade is concerned, the new State will import as many materials as possible from those nations that already have recognized her and from countries that purchase her products?

The great purpose of the Government of Manchoukuo is to shape a truly well-administered and prosperous State and to maintain cordial relations with the rest of the world. The gloomy anticipations and prophecies of many foreign observers and publicists in 1932, and after, have failed to materialize. There is no reason apparent why the new State should not continue its march of progress. Hundreds of millions of Yen have been expended in this new Realm and many more hundreds of millions are to be expended in coming years.

Where do these millions come from? Thus far, from Japan only. This factor alone furnishes the proof that the people of Japan are united in support of their Government. Will Japan be able to continue this heavy outlay for the development of Manchoukuo now that she has the great additional burden of having to finance a war in China as well? Perhaps, but assuredly not on such a scale as originally contemplated or as is desired. When hostilities in China come to an end, as come to an end they must, many hundreds of millions will be required for reconstruction and for new development in China proper. This upbuilding of the future in China will be achieved most effectively and more quickly if foreign capital is made available. If foreign capital cannot be obtained, however, still the great work will go forward surely, although more slowly—with Japanese money. Complete financial ruin for Japan was confidently predicted in the early thirties. After a year of warfare in China this same prediction is heard on all sides with ever increasing emphasis. Thus far, Japan has succeeded in financing this, her greatest military campaign, maintaining at the same time her credit status in the outside world. She has not yet defaulted on any foreign obligation, invariably paying principal and interest on due dates. How many of the great Occidental Powers can make such a boast?

Yamato Damushii !

The prophets of gloom have erred in their estimate of values having to do with the will and the patriotism of the Japanese people. Those who have lived in Japan and those who are intimately acquainted with the lives, the customs and the sentiments of differing classes may be critical of various aspects of national life in Dai Nippon, but they know that in this crass Twentieth-century world here is a people living with all the outward forms of modernity on divinely created soil in the presence of a living God. In such a setting any idea of revolution becomes grotesque. When Japan moves, automatically every atom of the national structure is brought behind the thrust of the Government. It is unimportant how the effect has been achieved. When a national emergency develops, when a question of the glory of the Empire arises, to the last yen, and to the last individual this unique solidarity of a people exerts a close-knit, united force, although the very existence of the nation may be staked on the throw of chance. Exactly that happened in 1905 when Japan astonished the world and challenged the might of Russia. It is happening again to-day.

The progress of a modern State may be guaged with some measure of accuracy by a study of the growth and development of lines of communication within that state. Within the six years of her existence Manchoukuo has made particular strides in this special sphere of national activity. Remarkable progress has been recorded in the whole field of communications. In telephony, telegraphy and wireless; and in aviation and various forms of transport the expansion and growth have proceeded steadily and extensively. In particular, railway construction and betterment has been outstanding, and the timely issuance recently of a comprehensive work on the subject of railways in Manchoukuo affords the opportunity to present in an authoritative way a factual record of what has been achieved. The author of this work, which has appeared in three volumes, in Mr. Michio Izawa, one of the leading technicians of the South Manchuria Railway who is well known throughout China. Some portion of Mr. Izawa's early training was gained as an employe of the Pennsylvania Railway in the eastern American states. For a period of years he was in charge of the Shanghai office of the South Manchuria Railway and now is a Director of the Company. He played a leading part in the rehabilitation of the State Railways of Manchoukuo when all the various railway lines in Manchuria were placed under the control and direction of The South Manchuria Railway.

Five years after beginning the huge task of co-ordinating the operation of all the railway lines in Manchoukuo, the author writing at the time that "The First Railway Construction Program" was nearing completion, estimates that the cash outlay for the building 4,000 kilometers of new railway lines was Y.400,000,000. The cost of repairing the old lines was Y.170,000,000; the cost of repairing and constructing harbors (the Yuki-Rashin line and the harbor of Hulutao included) was Y.50,000,000. Added to these costs the sum of Y.160,000,000 paid to Russia for the North Manchuria Railway (the former Chinese Eastern Railway), brings the total outlay to nearly Y.800,000,000, and this total does not include costs for repairs on the South Manchuria Railway and the Harbor of Dairen. Excluding costs for military operations in Manchoukuo, the sum given above comprises two-thirds of the total sum of Japan's investments in Manchoukuo.

Project Awakens Apprehensions

The author relates that this vast railway project was at first looked upon with doubt and disapproval by important interests which foresaw the necessity for the huge outlay that would be required and doubted whether profitable returns might be expected through exploitation of resources along the new lines to be built. One must look back on the railway situation as it was in earlier years, Mr. Izawa explains. Although Japan had, by treaty, the right to construct certain railways in Manchuria (for example, the Nishihara loan for the Kirin-Huining railway), not a single line was built after the construction of the Taonan-Anganchi and Kirin-Tunhua lines in 1925-26. It is to be seen, therefore, that the recent expansion and construction has been only the carrying out of plans made years ago for the development of this territory. The author continues:

Now, Manchoukuo's Five Year Industrial program is well under way with most favorable results for the industries of Japan. To what does Manchoukuo owe all this? To the speedy construction of railways and harbors. What made the national defence of Manchoukuo so steady and reliable at the time of the outbreak of hostilities in China? Again, the answer is railways and harbors. In view of these things, the author concludes, it may be said that Japan's capital investment for railways in Manchoukuo already has been paid back with interest.

It is recorded that, contrary to general expectations, the Manchoukuo State Railways, operated and managed by the South Manchuria Railway Company, have yielded better financial results each year in proportion with the return of peace and the prosperity of industries and the extensive increase of various construction works. From April to December, 1937, the Manchoukuo State Railways recorded increased revenues of Y.19,000,000, or 20 per cent as compared with the corresponding period of the preceding year. In this period the South Manchuria Railway made an increase of but eight per cent. These results indicate that the future outlook in North Manchuria is very promising whereas the situation in South Manchuria is nearing saturation.

The increase of revenues of the Manchoukuo State Railways is not proportional to expenditure at the present time, as the Manchoukuo State Railways are spending huge sums in the building up of personnel and the completion of various equipment. Yet the system has been maintaining interest return of between two and three per cent. This corresponds to the business results of the Chosen Railways in 1930-31 and is reassuring in view of the fact that interest returns of the Chosen Railways recently increased to 5-6 per cent. The Management of the Manchoukuo State Railways is convinced that the future financial outlook is most hopeful.

The circumstance that the traffic business of the Manchoukuo State Railways has been showing improving financial results each year bears a close resemblance to the situation with the South Manchuria Railway in its inauguration period. It is believed that this confirms the following facts: First, that the Government and industry in Manchoukuo are making remarkably sound and rapid progress; secondly, that the railways in Manchoukuo are not mere strategic lines, but are typically economic exploitation railways.

Some More Figures

The following figures show the business results of the Manchoukuo State Railways :—

Year	*Revenues From Railways*	*Other Revenues*	*Total*
1933..	Y. 54,005,000	Y. 4,820,000	Y. 58,825,000
1934..	72,025,000	11,380,000	83,405,000
1935..	103,013,000	17,615,000	120,628,000
1936..	124,465,000	16,649,000	141,114,000

The following figures give the revenues, expenditures and profits of the South Manchuria Railway Company from 1907 to 1936 (inclusive) :—

Year	*Revenues*	*Expenditures*	*Profits*
1907..	Y. 12,543,000	Y. 10,526,000	Y. 2,017,000
1908..	17,616,000	15,502,000	2,114,000
1909..	23,114,000	17,342,000	5,772,000
1910..	24,777,000	21,069,000	3,708,000
1911..	28,155,000	24,488,000	3,667,000
1912..	33,546,000	28,620,000	4,926,000
1913..	42,417,000	35,250,000	7,167,000
1914..	44,670,000	37,129,000	7,541,000
1915..	43,786,000	35,706,000	8,080,000
1916..	52,402,000	42,295,000	10,107,000
1917..	69,429,000	54,504,000	14,925,000
1918..	96,258,000	74,064,000	22,194,000
1919..	153,133,000	128,758,000	24,375,000
1920..	174,738,000	147,346,000	27,392,000
1921..	147,100,000	115,714,000	31,386,000
1922..	169,956,000	134,876,000	35,080,000
1923..	185,698,000	150,903,000	34,795,000
1924..	194,182,000	159,629,000	34,553,000
1925..	201,598,000	166,733,000	34,865,000
1926..	215,615,000	181,157,000	34,458,000
1927..	230,558,000	194,284,000	36,274,000
1928..	240,428,000	197,875,000	42,553,000
1929..	240,998,000	195,492,000	45,506,000
1930..	188,104,000	166,431,000	21,673,000
1931..	187,054,000	174,456,000	12,598,000
1932..	245,941,000	184,653,000	61,288,000
1933..	248,002,000	205,081,000	42,921,000
1934..	270,669,000	224,202,000	46,467,000
1935..	302,159,000	252,535,000	49,624,000
1936..	299,044,000	248,871,000	50,173,000

The marked progress of Manchoukuo as a nation and the rise in every line of industry brought about by Manchoukuo's five-year industrial program are naturally destined to enrich the Manchoukuo State Railways as well as the South Manchuria Railway Company.

Japanese Universities in China

Two well-known Japanese private universities plan to establish branch colleges in Peiping for the education of Chinese students.

They are Keio and Waseda, both of Tokyo. Mr. Harakuma, a director of Keio and Mr. Ito of Waseda University have arrived in Peiping and are busy discussing plans with local Japanese authorities and returned students from Japan.

It is learned that beginning this autumn Keio had decided to establish a school of agriculture to attract students from North China. The new school will offer course of special interest to Chinese students.

Keio and Waseda have always been popular with Chinese students. According to a conservative estimate at least fifty per cent of the Chinese returned students from Japan are graduates of these two universities.—*Reuter*.

State of Affairs in the Orient To-day*

By Major-General TSUNEKICHI KOHNO (Retired)

AT the moment the Manchurian Incident of 1931 broke out at Liutiaokou, a wave of excitement swept over Japan, for the nation was immediately conscious that the event would develop to serious proportions. During the preceding years a feeling of bitter indignation had been aroused among the Japanese people by the increasing pressure which the Mukden regime had brought to bear on Japanese nationals residing in Manchuria and on the nation's vested rights and interests in that region.

A remarkable contrast in sentiment is found, however, in the public reaction toward the clash at the Marco Polo Bridge on the night of July 7, 1937, which has since developed into the current armed conflict between Japan and China, Both the Japanese Government and the Japanese people did not sense such serious possibilities of danger in Sino-Japanese relations in North China. It is true, of course, that a number of complications such as the Pakhoi Incident and the Chengtu Incident, which had clouded relations between the two countries since 1936, still remained unsettled along with several other issues.

At this time Japan was eager for a readjustment of her relations with China, which unfortunately, however, were practically deadlocked as Mitsuaki Kakehi has ably pointed out in his article, "Whither Sino-Japanese Relations," which appeared in *Contemporary Japan* in September, 1937.

Outlook Was Promising

Nevertheless, a settlement of the outstanding difficulties seemed to be in sight. Early in June, 1937, the Konoe Cabinet was organized, and the veteran diplomat and former premier, Mr. Koki Hirota, assumed the portfolio for foreign affairs and undertook the task of improving relations with China. Toward the end of the month, Mr. Shigeru Kawagoe, Japanese Ambassador to Nanking, who had been in Japan on leave of absence, returned to his post with fresh instructions, and the Japanese public pinned considerable hope on his efforts for possible improvement in the situation.

Meanwhile, the first year of Japan's three billion yen, six-year, national defence replenishment program had just started. Therefore, when the Marco Polo Bridge Incident occurred early in the next month, the Japanese Government was eager for its immediate settlement by peaceful negotiations. In spite of this non-aggravation policy, the situation grew worse when fresh clashes occurred at Langfang on July 25 and at the Kwanganmen Gate of Peking the following day. As a result, the commander of the Japanese Garrison in China finally handed the Chinese an ultimatum at midnight, July 27, announcing his intention to take independent action.

This was followed by the commencement of punitive operations early the following day against the Chinese 29th Army which was stationed around Peking. Still the Japanese Government did not abandon its non-aggravation policy and hoped that the North China difficulties could be localized by negotiations with the Nanking Government. Finally, the murder of Lieutenant Oyama in Shanghai and the subsequent attacks launched against the Japanese landing party by troops of the Chinese Central Army foreclosed all hopes for a peaceful settlement.

Wide Area Occupied

The sombre results are now only too well known. During the past year the various units of the Japanese Army, Navy, and Air Force have valiantly fought against an enemy numerically far superior to them, capturing Chiang Kai-shek's capital at Nanking and carrying successful operations into other parts of the vast country. Thus the area under Japanese occupation now extends over nine provinces, including Suiyuan, Chahar, Shansi, Hopei, Honan, Shantung, Chekiang, Kiangsu and Anhwei, and the fall of Hankow, the enemy's second capital, is gradually becoming imminent. The success of Japanese operations can be seen from the fact that, while the enemy has suffered the loss of 510,000 lives (this number being the total of dead bodies found on the battlefields), only 36,000 Japanese troops have been killed in action.

In view of this situation, the leaders of the National Government of China must undoubtedly have a feeling of deep remorse. Yet why did they refuse to co-operate with Japan in the beginning? No doubt Chiang Kai-shek could not stem the tide of antagonism toward Japan which he had laboriously fostered himself. Another reason might be found in the misconceptions on the part of the Generalissimo and his advisers regarding China's military strength, the internal condition of Japan, and the possibility of intervention by other Powers.

Thus Chiang thought that Japan would yield if he assumed an uncompromising attitude and that he could bring the war to a successful conclusion if a direct clash occurred between the two countries. That Chiang Kai-shek was sadly mistaken has been clearly demonstrated by the actual course of developments. Then why does he desire to carry on the war after such military failures with no hope of victory in sight? He may still think that further resistance will cause Japan to collapse economically, a point which his incompetent advisers have no doubt stressed.

Chinese Psychology Blamed

A more logical reason, however, might be found in the psychology of the present-day Chinese, who think more of immediate ends than of the ultimate destiny of the nation. In other words they lack the usual conception of a State. Under the Ching and previous dynasties, China was ruled by a premier who undertook civil and military duties on behalf of the sovereign. Therefore, efforts were made to save the country even at some sacrifices when China was defeated in war by a foreign country. Moreover, in those days officials and soldiers were capable of feeling responsibility for their sovereign, as may be seen from the instance when Admiral Ting Ju-chang committed suicide after his defeat at the Battle of Weihaiwei during the Sino-Japanese War in 1895.

After the overthrow of the Manchu dynasty, however, various war-lords have come into power in different parts of the country. They have struggled for supremacy among one another in continuous internecine conflict where personal prestige and "face" have replaced the old tenets of patriotism. Of the unsuccessful war-lords, a few have reached a compromise with their rivals to "resign and go abroad," but the great majority of them have sought refuge in the foreign concessions to preserve their personal safety and property. Politicians, large and small, have come to identify themselves with different war-lords for personal gain. Such war-lords and politicians are to-day known as "Yaojen," or prominent men.

Chiang Kai-shek is perhaps the most successful of these Yaojen and is undoubtedly an able leader, but this does not alter the fact that he is a war-lord whose main concern in fighting Japan is the problem of how to preserve his own personal power and prestige. In view of this fact, he is naturally indifferent to the suffering caused among the Chinese people by his declared policy of "resistance at the risk of reducing the country to ashes." Such being the case, Chiang Kai-shek will in all likelihood hold out as long as he can and finally either "resign and go abroad" or seek refuge in Hongkong, or even possibly become a minor war-lord in the distant interior of the country. Under such circumstances it is obvious that Japan cannot co-operate with a Chinese regime of this kind, which must be overthrown for the benefit of peace in Eastern Asia.

In order to consolidate his power during the past decade, Chiang Kai-shek has promoted anti-Japanism as a national issue among the Chinese people. This has produced a trend to belittle Japan, which, in its various manifestations of hostility, has menaced Japanese lives and property in China. In addition, the anti-Japanese activities of the Chinese Communist Party have become noticeably more threatening since the Comintern-sponsored Sian Incident in which Chiang Kai-shek purchased his freedom with a pledge to co-operate with the Communists and oppose Japan.

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* From the August 25, 1938, issue of *Contemporary Japan*.

Japan Offered Peace

In spite of these facts, the Japanese Government has been willing to negotiate with Chiang if he would rectify his attitude, and after the fall of Nanking the Government communicated its basic peace terms through the good offices of the German Ambassador, Oskar P. Trautmann ; namely, a discontinuance of anti-Japanese activities and co-operation with Japan in anti-Communist measures and other issues of importance to the two countries. But this peace offer was ignored, and on January 16, 1938, the Japanese Government announced that it would no longer maintain any relations with the Chiang Kai-shek Government, but would instead, assist in the development of new regimes in China with the end in view of creating mutual friendship and prosperity among Japan, Manchoukuo, and China.

Thus the present conflict has grown into a campaign between Chiang Kai-shek's long-term, anti-Japanese warfare and Japan's efforts toward the long-range construction of a new China. Before attempting to predict the outcome of this struggle, it would be well to examine Chiang's program for prolonged resistance.

On what might be called the spiritual side, he is arousing anti-Japanism among the people by the issue of anti-imperialism. The confidence of the masses is bolstered up with exaggerated publicity about the assistance rendered by foreign Powers, false reports about Chinese " victories," and fabricated propaganda about the dangerous internal condition of Japan. All movements against the Chiang regime are vigorously suppressed ; the military leaders are under the constant pressure of vigilance and terrorism ; compromises are reached with malcontents in provincial districts who are too remote or too powerful ; and pro-Japanese act is stemmed by arresting the " betrayers," and pressure is brought to bear on any movement looking toward peace.

Thus through a gigantic propaganda campaign, through the radio, press, and handbills, supplemented by deceit and terrorism, Chiang Kai-shek fans the flames of anti-Japanism. There can be no doubt that he has forced the war on the Chinese public, and it is only too obvious that he cannot play this game much longer since the ravages of such a major war will soon awaken the people to the reality of defeat and to the falsehood of such propaganda.

From the military standpoint, the Chinese forces are now carrying on two kinds of warfare, open resistance and guerrilla tactics. The only advantage the Chinese have is their numerical superiority and the vastness of their country, but the Japanese Army is also fully cognizant of these facts and avoids reckless advances into the interior. In order to offset their inferiority in equipment and morale, the Chinese command has resorted to a cruel policy by which picked " supervising " troops fire on their compatriots who retreat from their first line positions before the Japanese attacks.

Inadequate Monetary Resources

The Chinese are financing their warfare by enlisting the assistance of the powerful Chekiang financial clique, operating their silver holdings abroad, floating war bonds, levying extra taxes, and collecting monetary contributions. If Chiang Kai-shek had adopted the military methods previously followed by the Communist Army, he would perhaps be able to carry on some measure of protracted resistance. But he has preferred to follow the capitalistic methods of warfare by pitting the strength of the Chekiang financial clique and China's foreign silver holdings (the war bonds and other financial resources are comparatively unimportant) against the collective financial power of the Japanese nation, for which his own monetary resources are no match.

The political aspects of the struggle reveal even more clearly the weakness of Chiang Kai-shek's position. He had originally planned Kuomintang-Communist co-operation in order to unify the anti-Japanese front, but both the Kuomintang and the Communist Party are trying to utilize each other for different purposes under the pretext of anti-Japanism. Moreover, the Communist Party is apparently utilizing the Sino-Japanese conflict for the purpose of undermining Chiang Kai-shek's power, hoping in the end to take over complete control of the government.

The " reduce-to-ashes " policy is also producing serious complications. The aim of such destruction, the burning of cities and villages, the wrecking of railways, bridges, and the embankments along the Yellow River and the Yangtzekiang, is to harass the Japanese troops much in the fashion as the Russian army did during Napoleon's invasion of Moscow. But this disastrous policy of wilful destruction is inflicting untold hardship on the Chinese people without appreciably hindering Japanese military operations, and as a result Chiang Kai-shek is losing the support of the masses upon whose strength and co-operation he hopes to carry out his protracted struggle.

Attempts to preserve the life of the Chiang regime by moving the capital further into the interior are attended by serious difficulties. Insufficient transportation and communications facilities will not only handicap the successful operation of the government, but will reduce its prestige and especially its control over other parts of the country, leaving it in the end little more than a mere provincial regime.

Diplomatic Relations Unpromising

Even Chiang Kai-shek's diplomatic relations with foreign Powers have been most unpromising. The Soviet Union has naturally taken advantage of the conflict to extend Red influence in China, hoping at the same time to weaken the position of Japan. But the Japanese Government fully anticipated such tactics, and for this reason has refrained from throwing the full strength of the nation into the contest, realizing the necessity to stand in readiness to cope with any change in attitude on the part of the Soviet Union. Great Britain is also pursuing a double-edged policy by assisting the Chiang regime in order to preserve her rights and interests in Central and South China on the one hand, and encouraging the boycott of Japanese goods in order to deprive Japan of her overseas markets on the other hand, hoping thereby to replace Japanese goods by her own products.

The United States, however, is absorbed with her own internal problems, and few Americans are disposed to court danger for the benefit of Great Britain, although through sympathy for what they believe is the under-dog, they are decidedly unfavorable toward Japan. France, in spite of her relations with the Soviet Union, is too fully occupied with European problems to embark upon complications in the Far East.

Therefore, with the exception of Great Britain and the Soviet Union, China can find an abundance of sympathy abroad but very little practical assistance. Even these two Powers, however, have other more serious problems to engage their attention, and so far all efforts toward organizing an international concert on behalf of China have proved futile.

Gestures are Futile

Chiang Kai-shek's reaction to the recent withdrawal of Ambassador Trautmann and the German military advisers by orders from Berlin, shows the extent to which he is struggling to enlist the support and sympathy of the democratic nations by playing upon their antagonism toward the Fascist Powers. Chiang is making comic opera attempts to convince the world that China is a democracy, organizing the so-called National Political Council at Hankow which ostensibly represents Chinese public opinion. Another gesture toward the democratic countries has been the acquiescence to French claims to the Paracel Islands, which obviously have been under Chinese jurisdiction. Such a dangerous step is opening the door to territorial partition, but this is the price China has always paid by pursuing her time-worn policy of trying to play off one Power against another. Nevertheless, such gesture toward the democratic countries appear all the more inconsistent when it is realized that the Chiang regime itself is actually a Fascist dictatorship, based upon the Kuomintang, the totalitarian party of China, which maintains its power by terrorizing all political opposition.

Viewed in its spiritual, political, financial, and diplomatic aspects, Chiang Kai-shek's policy of protracted resistance encounters obstacles at every turn, and it is difficult to see how this policy can be successful. The multitude of complications involved in such a long-term struggle are proving infinitely more serious to China than to Japan, and in the meanwhile the Japanese forces are bringing more and more Chinese territory under their control.

Many Western observers had concluded that such an extensive campaign would surely weaken Japan's economic structure, possibly bringing about its actual collapse. But a survey of the past year's fighting reveals some interesting facts. The present conflict is the most unprecedented engagement ever undertaken by Japan. Japanese troops in China now exceed the number employed in the Russo-Japanese War. Yet the main economic life of Japan is proceeding with little interruption, the transportation facilities operating on the usual peace-time schedules in spite of the fact that the nation is maintaining the largest army ever dispatched to the Asiatic mainland. This clearly demonstrates the extent to which Japan's economic power has grown in the thirty-four years since the war with Russia. A comparison between the position of Japan in 1904-1905 and to-day shows Japan's real strength.

Anglo-Japanese Alliance

At the time of the Russo-Japanese War, Japan enjoyed a number of advantages which are conspicuous by their absence to-day. The most important advantage was perhaps the alliance with Great Britain which not only prevented any outside interference, but also enabled Japan to purchase battleships and float war loans in London. During 1904-1905 practically the entire world was sympathetic toward Japan, France being the only country that remained friendly to Russia because of the Russo-French Alliance. In spite of this, however, the Rothchilds of Paris bought Japanese war bonds. World Jewish support went further than mere sympathy for the country which was fighting against their former oppressor, for, along with the Rothchilds, the Jewish banking firms in New York also subscribed to the Japanese loans. Moreover, in those days, American opinion had not been aroused over the immigration question and other issues, and President Theodore Roosevelt was openly in sympathy with Japan, even declaring that he would throw the weight of the United States on the side of the Anglo-Japanese alliance if other Powers came to the assistance of Russia.

To-day the situation is almost reversed. By becoming a world Power, Japan has awakened jealousy and suspicion among other nations. Her withdrawal from the League of Nations during the Manchurian Incident and her abrogation of the Washington and London naval treaties has left her more or less isolated, while her commercial advance into British and American markets and elsewhere has provoked bitter resentment. Therefore, Japan cannot look for sympathy abroad as she did in 1904-1905. Not even the best Chinese propaganda could create such a disadvantageous situation.

In the present conflict, without sympathy or allies, Japan has to face the fact that Great Britain and the Soviet Union are assisting her enemy, taking advantage of the League of Nations and other international organizations to weld opposition to Japan. This is particularly the case with the Soviet Union which has at its disposal the ramified organs of the Communist Party. On the other hand, Japan does not have a single organization or agency which can operate abroad on her behalf. The international position of Shanghai offers another serious obstacle. China purposely drew hostilities to that vicinity, knowing fully well the international repercussions which would follow from military operations indirectly affecting the lives and property of foreigners, naturally stimulating their resentment toward Japan.

Although Japan entertains no discriminatory feeling toward the Jews and is grateful for the services they have rendered to Japan in the past, nevertheless, the conclusion of the Anti-Comintern Pact with Germany has tended to estrange the Jews throughout the world, whereas in 1904-1905 they were Japan's firmest supporters. Under such circumstances China is afforded unlimited possibilities to play on foreign sympathy and bid for foreign support, while Japan has practically no such opportunities.

Thrown on Her Own Resources

But even more formidable disadvantages are present to-day. Anti-Japanese sentiment abroad has led to the boycotting of Japanese goods which adversely affects Japan's vital foreign trade. In addition, Japan finds herself compelled to wage this war entirely on her own resources, without foreign loans or credit. When it is considered that the magnitude of this contest greatly exceeds that of the Russo-Japanese War which was fought with foreign sympathy and foreign loan, it is obvious that Japan's national strength is far greater than most observers have generally anticipated, and the possibility of collapse, so frequently entertained abroad, is merely wishful thinking.

In comparing this contest with the Russo-Japanese War, Japanese keenly regret the attitude assumed by Great Britain, Japan's former ally. Japan is, of course, fully aware of Great Britain's vast interests in China which are greater than those of any other Power, but when hostilities broke out, the British Government immediately attempted to preserve these rights and interests by aligning itself with the Chiang regime against Japan. Since then Great Britain has consistently pursued an obstructionist policy toward Japan, attempting to maneuver the United States into a united front on behalf of China. Public opinion in England has been agitated by the insertion of anti-Japanese phrases in the royal message opening Parliament, by arranging for the Dean of Westminster Abbey to attend an anti-Japanese meeting in Hyde Park. Japanese now realize for the first time that Great Britain can be either a gentlemanly ally or an extremely wily enemy. But England's dependence upon Chiang Kai-shek's tottering regime for the protection of her rights and interests also reveals the helplessness of her great empire. With her long experience in China, it is indeed strange that England does not realize what might be in store for her if Chiang, through her support, is able to defeat Japan.

West Loses Prestige

The unfortunate situation in China is partly a result of the fact that the great European Powers have been helpless since the World War. This fall in prestige and power, especially in the case of Great Britain which had enjoyed such an unrivalled political and economic position in China, coupled with the collapse of Tzarist Russia, has directly stimulated a growing contempt and disregard on the part of the Chinese for the white race. China's respect for the White Man was seriously undermined when large numbers of White Russian refugees came to work in China as laborers, as the hired soldiers of provincial war-lords, or as prostitutes in the seaports. European prestige was dealt another blow when the Powers began to kowtow before China in an effort to secure favorable tariffs for their products in order to save their industries from collapse after the Great War. The loss of extraterritoriality by Austria and Germany during the war also shattered the position of Europeans in Chinese eyes. At the same time the growth of Communism has stimulated this anti-foreign attitude which has been coupled with the party's general anti-imperialism program.

Anti-foreignism in China is a deep-rooted sentiment. It can be seen in the studied contempt with which the Manchu dynasty greeted the first overtures from the Western Powers. More recent examples can be found in the famous Boxer Rising of 1900 and the Nanking outrages of 1927. Anti-Japanese agitation in China is in many ways merely one expression of this contempt and hostility which has been displayed toward foreigners generally. It should not be forgotten that little more than a decade ago Great Britain was receiving the brunt of such anti-foreign outbursts. Now it has become Japan's turn, and if Japan is defeated in this conflict, there is no doubt that the triumphant, pro-Communist regime would begin a general campaign for the expulsion of all foreign rights and interests from China. It would be well then for Britain and the other Powers to reflect upon what might be the ultimate result of their aiding this general anti-foreign movement.

Japan Reduces N.Y. Fair Pavilion

Blueprints were radioed three quarters of the way around the world as Japan on August 24 ordered a reduction in the size of her pavilion at the 1939 World Fair in New York. In conforming with the wartime economy measures, the Japanese Government saw fit to revise her pavilion plans by reducing them to half of their original size.

Engineers from the Commerce and Industry Ministry left Tokyo for New York last April planning to construct a Japanese pavilion covering 709 tsubos with an additional 224 tsubo verandah attached. Under the new economy plan, the Japanese " palace " will be reduced to 252 tsubos with a 146 tsubo verandah. One tsubo is equivalent to 35.58 square feet.

Russia's Arctic Empire in the Next War*

By H. P. SMOLKA

We cannot rule out the possibility that Japan's present war in China may grow to involve the Soviet Union and even perhaps Germany. In that event there will come into play a new geopolitical factor which has improved Russia's strategical position in comparison with what it was in 1905 and in 1914. The Soviet Government's recent rapid development of navigation in, aviation above, and industrial enterprise along the shores of the Arctic Ocean has partly solved the age-old and crucial problem of Russia's precarious access to the great outside world. The fact gains additional importance from the circumstance that transportation is still the weakest wheel in the Russian war machine.

Only in the last few months has the world begun to be conscious of Russia's energetic efforts to push open her frozen window in the North and develop a Polar Empire. This consciousness has come largely from Soviet flights across the North Pole and the establishment of a permanent floating weather station in the center of the Arctic. But though these are spectacular they nevertheless are comparatively small parts of the whole scheme of expansion in the Far North.

Other items obviously of greater importance are : the regular annual operation of the new shipping route along the North-east Passage, with the help of four main ice-breaker bases and a fleet of over one hundred Arctic airplanes ; the sinking of nickel mines and oil wells in Northern Siberia (to mention only the most significant industrial enterprises in the Polar regions) ; the organization of heavy transport on the rivers Ob, Enisei and Lena, with ports and provision for the exchange of loads in their estuaries (Novy Port, Igarka and Tiksi respectively) ; and the establishment of a chain of independent coal and oil refuelling bases for water vessels and aircraft. In other words, the " backyard of Asia " is about to become the front porch of a newly oriented " Arctic-conscious " Russia.

Exclusive Development Charter

" Glavnoe Upravlenie Severnovo Morskovo Puti," the Central Administration of the Northern Sea Route, was set up as an independent government department under Professor Otto Schmidt and made directly responsible to the Council of Peoples Commissars. It has an exclusive charter to develop all of the Union's territory above the 62nd northern parallel, an area of ten million square kilometers. Everything in this region is under Glavsevmorput's jurisdiction—transport by sea, river and air ; industry ; town building ; reindeer breeding ; wireless and meteorological services ; native education ; scientific study of the earth, the flora and fauna. The peoples of the North are the subject of study in two special university-like institutions : the Institute of the Peoples of the North and the Arctic Institute, both in Leningrad. Last year Glavsevmorput had already spent an equivalent of $1,000,000,000 on its activities, while 40,000 men and women, a regular army of invasion against the Arctic, were on its payroll. Russians like to call this enterprise a modern socialist equivalent to the East India Company. Undoubtedly in scope and achievement it is the largest systematic pioneering organization in the world to-day. Nor can it be denied that its value to the Russian nation will be at least as great in peacetime as in war. If as expected it makes the vast natural riches of Siberia more easily accessible and exploitable, both for the Soviet Union and for the world, its historic consequence will be very great.

At this particular moment, however, the military implications of these vast developments command even closer attention than the economic. Let us picture Russia in the hypothetical but not impossible case of a conflict with both Germany and Japan.

One of the first things that would happen immediately after the outbreak of hostilities would undoubtedly be a German blockade of Leningrad and a Japanese blockade of Vladivostok. After recent experiences in the Mediterranean, the Black Sea ports could hardly be cited as a safe outlet for Russia to the rest of the world. Co-operation between Russia's European and Far Eastern fleet would become impossible. Imports of commodities and war material from the major industrial countries would be out of the question. Two war fronts, roughly five thousand miles apart, would remain linked by just one railway line, almost hopelessly overburdened even by peacetime requirements and easy for a few Japanese airplanes to put out of action at more than one point along the Siberian border.

Russia would thus be bottled up on three sides : west, south and east. But in the north—and there only—there is an independent, continuous and all-Russian coastline, unassailable by anyone. It is icebound for the greater part of the year. But during three months—or somewhat more, depending on climatic cycles and the increasing efficiency and experience of Arctic craft—navigation has been proved possible in four consecutive seasons. This ocean link from Murmansk to the Bering Strait is valuable from three major points of view : (1) warships can be brought from European to Far Eastern waters, and vice versa ; (2) products of the more highly organized industries of European Russia and agricultural commodities from Siberia can be exchanged ; (3) supplies, so far as permitted under existing political and commercial relations, can be brought in from the United States, Canada and South America.

Question of Submarines

Furthermore, all the year round, unlimited air squadrons produced by the warplane factories in the Moscow region and the Ukraine can be flown out to the Far East via the north coast and across the Polar Sea. This route is not only somewhat shorter than the line along the Trans-Siberia Railway but is entirely out of the reach of any enemy. The question of submarines travelling below the frozen surface of the Arctic Sea during the cold season has not yet been mentioned officially by anyone in the Soviet Union. But there are indications that serious attention is also being paid to this scheme, originally devised for exploration purposes by Sir Hubert Wilkins.

I had an opportunity to visit some of the new centers in Arctic Siberia not long ago. I saw Murmansk, where naval dockyards of considerable capacity are nearing completion. These, I am convinced, will soon become the main naval base for the Russian fleet in Europe. Thanks to the Gulf Stream, Murmansk is ice-free all the year round even though it lies well within the Arctic Circle, whereas Leningrad is blocked for a few months every year. From the tip of the Kola Peninsula ships can reach the Atlantic without having to run the triple gauntlet of the Finnish Gulf, the Kiel Canal or the straits between Germany and Denmark, and the English Channel. During the summer, the Pacific Ocean can be reached eastwards by a route that is almost half the distance by the two alternative ways, i.e., by the Panama Canal or the Red Sea ; and in those two cases many zones of foreign influence would have to be crossed. Communication with Leningrad from Murmansk can be established "from within" through the recently completed Baltic-White Sea Canal. The depth of this Canal has never been officially announced, though Murmansk is already the head station of the Northern Sea Route. Murmansk is provisioned with coal for supplying ships as well as the railway down to Leningrad. This coal comes from Spitzbergen, where the Soviet Government operates mines under concession from Norway.

Trade Outlets

My visit also took me to Igarka on the lower Enisei, a town with a population varying by seasons between 14,000 and 20,000, possessing a permanent harbor with mechanized loading machinery, lumber mills, power plants, theaters, hospitals, schools and agricultural plantations. Situated 400 miles upstream, and about 120 miles north of the Arctic Circle on perpetually frozen tundra soil, Igarka is the main center for the export of Siberian timber. Logs are rafted down towards it during the summer, cut up in the following winter, and shipped off, mostly in British tramp steamers, in the subsequent months of August and September. In wartime Igarka

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*In *Foreign Affairs*

could be used from July to October for load exchange between vessels coming from Europe through Archangel or Murmansk and river craft coming from Central Siberia, thereby supplying and draining the area between Novo Sibirsk and Irkutsk. Novy Port serves a similar purpose for the area of the Ob, the rich wheat district of Western Siberia, the coal and steel combines of Kuznetsk, and (via the Turksib Railway) the cotton fields of Central Asia. Tiksi on the estuary of the Lena would be used as entrepot for transports coming in through the Bering Strait and going out from the whole Lake Baikal and Yakutia region—incidentally affording a safe route for exporting the vastly increased gold production of that district.

I also saw Dickson Island, off the mouth of the Enisei; Matochkin Strait on Novaya Zemlya; the mining district of Dudinka-Norilsk on the western side of the Taimyr Peninsula, and Nordvik, the oil and salt center, on the eastern side. Dickson Island is the main wireless exchange of the Arctic, center for the whole network of Polar radio stations, able to contact by short-wave telephony any major town between Moscow and Vladivostok. There were also under completion at Dickson Island spacious coal storage establishments and bunker-provisions for ice breakers and merchantmen. Matochkin Strait is one of the three gateways to the Polar basin for all craft coming from and going to European waters and serves as the base of action for ice breakers which convoy shipping caravans through difficult spots on the Northern Sea Route.

The Dudinka-Norilsk region is of importance because the Norilsk mountains contain rich coal, iron, copper and nickel deposits. The latter are particularly valuable, since nickel is one of the few metals of which, so far as is known, the Soviet Union possesses only small resources. A narrow-gauge railway has been constructed between Dudinka, which lies on the Enisei, and Norilsk, seventy miles east of the river shore, thereby linking the waterway system. Its coal, situated as it is almost at the center of the Northern Sea Route, will also be of good use to shipping on that route and on the Enisei, saving cargo space to steamers calling at Igarka or on through passage over the whole route. Finally, Nordvik, apart from supplying salt to the potentially vast North Siberian fish-canneries, has oil deposits right on the shores of Yakutia, thereby providing refuelling opportunities for Diesel-driven ocean vessels and aircraft operating throughout the Arctic. Machinery and personnel to lay out plants and operate the Arctic oil field were sent out to Nordvik last year.

Trained for Arctic Conditions

My trip by air over part of the network of Arctic Siberian air-lines afforded a good opportunity for study at first hand both of the ground organization and the personnel of pilots and mechanics. These are specially trained for Arctic conditions and form a separate force from other Soviet air men. All the machines regularly employed in the Far North are equipped with floats and skis. The air bases are on the rivers, the seacoast and on lakes, since climatic conditions make the construction of landing grounds for the summer extremely difficult. In winter, landings are made on the ice. The flight of the ANT 25 in the summer of 1936, under the command of Chkalov, who also led the first flight from Moscow to California, demonstrated the practicability of non-stop flights across the Arctic Ocean from Moscow to the Far East, via Franz Josef Land, Nordvik, and Yakutia. This airplane landed at Nikolaevsk on the Amur River 56 hours and 21 minutes after leaving Moscow. The North Pole flights have shown since then that the machine has a radius of action of almost 8,000 miles, proof of the correctness of Chkalov's assertion that he could have flown on directly to Tokyo. And the flight was 200 miles shorter than if Chkalov had taken the route along the railway line, where at least for the last third of the flight he would have been continuously within the range of foreign air-craft. There are numerous air bases, along the coast and inland throughout Arctic Siberia, all of them equipped with radio stations, meteorological observation posts, some of them with repair shops, and staffs of trained mechanics. Other flights from California up the American West Coast across the Bering Strait and then along the Northern Sea Route have demonstrated the possibility of flying planes purchased in the United States to the Far Eastern territories. Here again the route is one that would be safe from enemy interference. The same would naturally apply to trans-Polar flights.

Even more important, however, is the development of the Arctic in view of the possibility that war supplies might be imported from America to the Soviet Far East, following the west coast of the United States and Canada and then through the Bering Strait to the mouth of the Lena. Even if the American Neutrality Law in its present form were enforced, Soviet steamers could call at American west-coast ports to load supplies, could then navigate northward (within the three mile limit if need be), and could then slip through the Bering Strait without having ever for one moment to incur the risk of interception by enemy warships. Bering Strait and the region south of it can be easily controlled by a very small Soviet force. Navigation beyond it depends entirely on the continuous help, guidance and advice of the Soviet wireless stations and the air scouts that map the route through drifting ice floes by flying ahead of the caravans and the ice breakers that clear passages through blocked areas. It would be entirely impossible for any intruder to make headway in these waters.

Certainly the opening up of the Far North does not compensate Russia completely for its treatment at the hands of her step-mother, geography. The sea route is navigable for only three or three and a half months each year. Even then, the process is costly and laborious. But this route does under the given circumstances afford a partial solution of a crucial problem. And appraised in connection with the general gains that will acrue to the nation from the successful progress of colonization in the Polar regions, one could not write that the strategic advantages are being bought too dearly, tained as a by-product of other industries, and whose direct costs of producing platinum are therefore limited to the expenses of refining. At the present rate of output these amount to 7s. or 8s. per troy ounce and are still well covered by the present price of £6 per ounce, although this price is less than a quarter of that of 1924.

It is this tremendous fall in the cost of production and the consequent fall in price which have encouraged the use of platinum for entirely new purposes during the last ten years. The development has been hastened by the policy of the International Nickel Company, who have carried out research on the possibilities of platinum as an industrial metal. Its high melting point and specific gravity, its freedom from oxidation at high temperatures, and its comparative immunity from acid are all properties whose industrial value has not hitherto been adequately appreciated.

Widely Increased Use

In recent years, the electrical industry has greatly increased its purchases of platinum for such purposes as contact points, power switches, thermostats, resisters for high temperatures, electric control apparatus, clocks, etc., and the chemical industries have found it useful for laboratory equipment, for anodes, and as a catalyst in the production of sulphuric, acetic and nitric acids. Rayon firms now use platinum for spinnerets, glass manufacturers use it as a dye, architects employ it as a plating material. The armament industries have developed a considerable demand for platinum and platinum metals for instruments, for reflectors and lamps for searchlights, and for contact points in aeroplane engines. As a result of these developments, the world's absorption of platinum increased from the low level of 75,000 ounces in 1932 to 200,000 ounces in 1934, and to approximately 450,000 ounces in 1937.

The United States Bureau of Mines publishes annual estimates of the American consumption of platinum and of its distribution among the different industries, which may be taken as representative of the world's consumption. According to these figures, the jewellery trade remains the largest consumer of platinum, although its share of the total fell from 55 per cent in 1928 to 37 per cent in 1936. Owing to its much reduced price, platinum is becoming a popular jewellery metal which is replacing gold to an increasing extent. Dentistry is the second most important consumer and took 25 per cent of the American deliveries in 1936, compared with 12 per cent in 1928. The electrical and chemical industries accounted in 1936 for 14 per cent and 13 per cent respectively of the total consumption.

The fall in platinum prices from 1924 to 1936 has therefore been the sign of a healthy and expanding industry, though it has naturally brought considerable difficulties to the high cost producers. In the last few months, indeed, the fall has been accelerated by a decline in the demand for the metal for jewellery and ornamental purposes and by the cessation of the speculative buying which was very noticeable in the early part of last year. But the industrial demand has been stimulated by the expansion in armaments, and the fall in the price of platinum to a level in close proximity to that of gold opens the way to new industrial uses, which ultimately restore a new equilibrium on the basis of the increased potential production.

Admiral Uriu's Last Letter to an American*

As his last service to Japan, the late Admiral Baron Sotokichi Uriu, deeply regretting the anti-Japanese feeling in the United States regarding the China Emergency, wrote the following letter to his Annapolis classmate. He passed away one week after mailing it.

Mr. O. E. WELLER,
Public Service Commission,
Munsey Building, Baltimore, Maryland, U.S.A.

MY DEAR WELLER:

IT was most delightful to hear from you, to know that you are in good health and still actively engaged in public service and leadership. It is that, I think, which gives distinction to our class and makes it remarkable. Age has retired me from active life, but it has by no means removed my interest in life and human affairs. And to know that you are still "going strong" stimulates the nerves and makes one feel invigorated somehow.

I am very grateful to you for telling me about the other members of our class. Indeed, I regret to know that many of our fellows have crossed into the Great Beyond, for they were all grand fellows, but at the same time it was encouraging to hear that there are 25 of us still here and, though separated by distance, still bound by the ties of comradeship.

For some years I have not been on the good side of health, but this has not affected my morale in the least. As Parsons wrote in his letter to you, which you kindly enclosed, age is but a quality of the mind. I believe so. And when letters like yours come to me, I feel thoroughly vivified. Nothing could be as comforting to an old man in retirement as a letter from an old friend which awakens vivid memories of old times and of the many happy days we used to spend together.

Living in the quiet town of Odawara by the sea, whose shores are swept by the same waters which sweep the Pacific shores of your country, I cannot help but reminisce about our friendly associations, not only in the personal sense, but also as links which bind your country and mine in bonds of amity. As I read newspaper reports from the United States indicating rather widespread condemnation of what Japan is now doing in China, I began to feel anxious about developments in Japanese-American affairs.

Unbroken Friendship

Your country, having been for many years a mentor to mine during its period of infancy as a modern nation, we have every faith and trust in the traditional friendship between our two countries, a friendship unbroken since it began over 80 years ago. We in Japan know that our ties of friendship are unseverable and hope that they will not only prevent unpleasant developments, but even exert themselves in times like this in a positive and constructive manner.

I regret to hear that America doubts our actions and our policy in China. I regret to hear that there are organizations in your country urging a general boycott of Japanese goods. At no time have I felt as anxious about our mutual relations as I do now and at no time have I felt a greater need for a positive reassertion of the friendly spirit which has guided our relations through the years.

Perhaps my country has been misrepresented, perhaps misunderstood. Perhaps a large body of your people are uninformed about Far Eastern affairs and developments in recent years. Perhaps I am not representing America properly when I say these things. Whatever the case may be, I feel, as your friend and as a friend of America, that I should say something about the conflict and endeavor to dispel even a little, if I can, of whatever misunderstanding may be entertained by the people in your country.

Let me try to convey to you what the average intelligent Japanese thinks and feels about the trouble in China. Japan is now desperately trying to establish and secure those conditions which are essential for peace and stability in East Asia. Paradoxical as it may seem, she is engaged in a mission of peace. She is fighting for it with armed forces because all peaceful methods had been exhausted. The government and people of Japan deeply regret that this method had to be employed.

We have often been condemned as a warlike nation, and our critics fail to remember or do not know at all that ours is a tradition of peace. We are strong because our country is always united by traditions and a system which date from time immemorial. It is this spirit of unity, this strength, which enabled Japan to construct a modern nation within my own lifetime and elevated us from feudalism to modernism. It is this national strength that pushes on our many peaceful developments—our industries, our commerce, and others. It is this strength that asserts itself in times of emergency. And to-day the nation stands as one man to fulfil our mission of peace on the continent of Asia.

Judgment Too Hasty

A careful reading of Far Eastern history and deep study of the characteristics and cultures of Asiatic peoples should make the whole situation clear and understandable, and I think it is the height of folly for any one to pass judgment on the Sino-Japanese issue without this background of knowledge.

I am not going to waste your time by relating developments of the present conflict. Instead, I am sending you under separate cover two pamphlets titled, "How the North China Affair Arose" and "Why Japan Had to Fight in Shanghai." As the development of the hostilities in both areas is very accurately reported in these pamphlets, I hope they will serve as good references.

What I am interested in relating to you here are those pertinent and essential facts which, I think, should be considered in any impartial judgment. First, Japan fully recognizes that China has grievances against us as we have against her. We fully recognize the desire of the Chinese to organize and unify their country into a real national entity, which it has never been. And we are fully aware that only an organized and stable China can secure peace and stability in East Asia.

But it must be remembered that China's real grievances are historical, dating back and mounting from 100 years ago when western powers began to dismember China and force upon her the so-called unequal treaties. Japan was the last to appear on the scene and in her case she obtained her share because her very national existence depended upon it. This fact cannot be challenged. Japan's geographical position, her nearness to China, is the irrefutable testimony.

The recent growth of nationalism in China is a growth directed at throwing off her foreign yoke in order to gain complete freedom from foreign domination. It is a just aspiration as such, but this fight for freedom has often taken place in the form of violence against one foreign nation or another. British and Americans have already tasted it. Now Japan happens to be the target and fares the worst, not only because of the magnitude of the conflict, but because the whole world condemns her for retaliating and seems to be trying to let Japan shoulder the whole burden of Chinese grievances for which she is only partly responsible.

What Japan is fighting to-day are China's violent anti-Japanese policy and the menace of communism. We would have no cause for complaint if the anti-Japanism in China were a natural, spontaneous sentiment. But such is not the actual case. China's anti-Japanism is a policy used as a means of unifying national support around the central government at Nanking.

Spread of Anti-Japanism

It has been pursued in an organized and systematic way. It is preached in the schools of the land from the grade schools up. It is written as regular lessons in school textbooks. As over 90 per cent of the population is illiterate, the campaign is spread through posters and over the radio. And this policy has reaped a rich harvest of results in the form of student demonstrations, of murders,

(Continued on page 301)

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*From *Osaka Mainichi.*

Soviet Ukraine—Land of Plenty and Purges[*]

The class enemy inside the country and the Fascist aggressor pressing against the frontier are the twin hobgoblins of the Soviet Union. In foreign countries and even in Moscow, they often seem to be creatures of the Bolshevik imagination. In the Ukraine, as in the Soviet countryside generally, they are political realities and something more.

Dnepropetrovsk (formerly Yekaterinslav, named after Catherine the Great) is the heart of the industrial Ukraine. For this city and the region around it, both the class war and the fear of Fascist attack are more than Communist rhetoric. The city itself was occupied by the Germans in February, 1918, a few months after the Bolshevik revolution. When the Germans withdrew at the end of that year, they turned it over to the Whites. The Bolsheviks recaptured it, and command of Russia's oldest metallurgical base, more than two years after the seizure of power in Petrograd.

This is a key city of the new Russia which the Soviets have built. It is halfway between the coal of the Don Basin and the iron ore of Krivv Rog. It is the center of a dozen major plants built around Dneproges, the power plant built by the late Colonel Hugh Cooper which now produces more electric power than all of Russia before the war.

For Russians living here, the confused history of the civil war is living memory. A railroad guard told this correspondent how he had helped to defend a hill in Perekop, where the Ukraine is linked to the Crimea, against a White attack, his partisan band of peasants armed only with rocks against the rifles of the attackers. A passenger on the same train, a Jewish engineer, described a pogrom he lived through in 1919.

If these memories needed reinforcement, Adolf Hitler has supplied it. The rise to power of the Nazis in Germany and the increasing momentum of their new-style "Drang nach Osten" have made the traditional Bolshevik war scare no longer an exaggeration.

Hitler Looks to East

"We begin where Germany let off six hundred years ago," Hitler wrote in "Mein Kampf." "We are stopping the eternal Germanic migration to the south and west of Europe and are directing our glance to the land in the east. We are at last winding up the colonial and commercial policy of the pre-war period and passing to the land policy of the future. When, however, we speak in Europe to-day of new land and new soil, we can only be thinking primarily of Russia and her subject border countries."

This is the menace which hangs over the Soviet Union and primarily over the Ukraine. Seen at close quarters, in these provincial cities where rehearsals against air raids have already become routine affairs, this menace makes the Soviet purge less baffling. What seems in Moscow a senseless riddle, a political hysteria unbroken except by the executions of former Bolsheviks, is still a riddle to Dnepropetrovsk, but it is a riddle that can be solved.

Looked at from the heart of the Ukraine, this region is a natural lodestone for the expansive energies of a Germany which requires more food and more raw materials. Besides producing one-fifth of all Soviet grain in 1937, the Ukraine's fields turned out more than two-thirds of the country's sugar. Cotton, tobacco and soy beans have been successfully introduced on a large scale.

Industrially, the wealth of the Ukraine is even more striking. Its 67,000,000 tons of coal produced in 1937 were more than three times the output of France, Poland or Japan. Much of it was anthracite so low in ash content and high in heat units that it can profitably be exported even to the United States. The Ukraine poured more than 9,000,000 tons of iron in 1937—twice as much as all Russia produced in 1913.

At Dneproges, a few miles from the Dnieper River, eight of the world's largest turbines, five of them built at Schenectady, N.Y., by the General Electric Company, have been made the nucleus for a net-work of aluminum, quality steel and machinery plants. Lenin's slogan—"Socialism is the soviets plus electrification"—has here been rewritten in new cities, new plants, a modern industrial region.

If many of the plants are new, trade-marked "Made in Soviet Russia," few of the people are. Fear, revenge and hostility are rooted deep in many of the hurrying men who give the Ukraine its present appearance of busy prosperity. Under a dictatorship, whether of a single man or of the proletariat, there is no way of counting these people, even roughly. They are the core of the domestic problem in the Ukraine, as the German "Drang nach Osten" is the core of its foreign problem. The purge has been and still is a Bolshevik answer to both problems.

Profit Motive Replaced

On the one hand, the Bolsheviks claim to have rebuilt the peasantry of the Ukraine by collectivization and the five million workers and employes of the same territory by substitution of socialist incentives for the profit motive. Alexei Stakhanov, the coal miner whose name has been given to the newest socialist form of labor organization—the Soviet variant of the American speed-up—is himself a Ukrainian, brought up in the Don Basin coal fields.

There was not one Ukrainian-language school in 1917; now there are 17,736, teaching 4,319,000 children in their native speech. The Soviets claim to have built a total of 5,653 new schools in the Ukraine since 1917. There are a few Soviet Ukrainian scholars with world reputations: Trofim Lisengo, the Soviet Burbank; Professor A. A. Bogomolets, cancer specialist; Dr. V. P. Filatov, the first man to transplant successfully the cornea of an eyeball. Mikhail Sholokhov, the Soviet Union's most popular author, is a Ukrainian; in Alexander Dovzhenko the Ukraine has produced one of the Soviet's leading motion-picture directors.

On the other hand, the Bolsheviks own count of the enemies they have produced grows day by day more staggering. Besides the "kulaks," or wealthier peasants, and other open enemies who have been liquidated, it includes many of the men who built the Soviet Ukraine. Except for Gregory Petrovsky, bearded President of the Ukrainian Republic, there is hardly a Ukrainian political figure of a decade ago who is still in office.

The others have been disgraced. General Jonas Yakir, military commander of the Ukraine and hero of its civil-war struggle, was shot with Marshal Tukhachevsky. P. P. Lyubchenko, chairman of the republic's Council of People's Commissars, committed suicide last September. Gregory F. Grimko, Ukrainian, who was Soviet Finance Commissar for seven years, was executed after the Bukharin-Rykov trial in March. Pavel Postishev, Communist party secretary of the Ukraine, has himself been driven into retirement and disgrace by the very purge he helped to start two years ago.

It's Baffling to Russians

In two weeks of travel in the Ukraine one meets few Russians who are not themselves in some degree baffled by the paradox of apparent prosperity and continuing purge. But part of the answer to the riddle is written more clearly on the landscape here than anywhere in Moscow.

The men who built the Ukraine's new factories knew better than any one else the narrow margin which separated the Soviet Union in 1930 and again in 1932 from internal collapse. They wrestled with the famine which resulted from collectivization; spurred by Moscow and the Kremlin, they drove through the first five-year plan. Many of them, frightened by the speed of Stalin's program, began to doubt his success, and talked with each other as to what could be salvaged in the event of complete collapse.

For Stalinists, as for Prosecutor Vishinsky at the last trial, such doubt amounted to treason, and such conversations to conspiracy. Their answer has been the purge. With the Ukraine still filled with class enemies, remnants of expropriated classes, and threatened by the expansive pressure of Nazi Germany, any other answer, according to these Bolsheviks, would be suicide for the revolution.

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[*] From the *Japan Times*.

Soviet Propaganda in America

By RALPH TOWNSEND (Former U.S. Vice-Consul at Shanghai and Foochow; Author of Ways that are Dark)

A TINY item from Washington in the newspapers is informing. We learn that Mexico has agreed to settle claims of American citizens for property confiscated and destroyed during Mexico's period of civil wars some years ago.

The report says these claims are to be settled for a sum representing one cent on the dollar as compared with the total of the original claims. I have no knowledge of the details and therefore have no basis of comment upon the strangeness of a one cent on the dollar settlement. But note that none of our sensationalists eager to stir trouble for us abroad have become excited over Americans waiting more than 14 years to get one cent on the dollar from Mexico.

Similarly, our war mongers have not become excited over Mexico's very recent confiscations of some five hundred million dollars worth of American oil properties. Nor have they become excited over the closing of churches in Mexico and the expulsion of religious leaders during recent years. But the absence of whooped up excitement and hate campaigns here over these developments in Mexico is not surprising. Mexico is favorable to the Soviet Union.

Anything a pro-Soviet nation may do is all right with our war mongers, while the same actions by an anti-Soviet nation drew radio headline blasts of hate and war talk.

In 1923 the Soviet Union seized Outer Mongolia, an immense area of Chinese territory. The Soviet Union still holds it. But very rarely indeed is that mentioned in any American newspaper or magazine or over the radio. The Soviet Union is a Red nation.

In 1929 the Soviet Union invaded what is now Manchoukuo and for many months fought an undeclared war with Chinese soldiers on Chinese soil. You rarely hear that mentioned now. The Soviet Union is a Red nation.

During that war, Chinese appealed to the United States and to the League of Nations. The League pretended not to hear. The American government addressed notes to both China and Russia hoping the two would find a means of settling the war promptly. Our Secretary of State then was Henry L. Stimson. Interestingly, he did not feel that it would be good policy to call any nation the aggressor.

To-day Henry L. Stimson, busy day and night pouring torrents of abuse upon Japan, seems to have no hesitation in naming the Japanese as the aggressor. Japan is an anti-Red nation.

When Mr. Stimson wrote to the Soviet Union on December 1, 1929, while he was Secretary of State, reminding Moscow of peace treaty pledges, he got a prompt and hot answer from Maxim Litvinov of the Soviet government.

Litvinov's Reply

Litvinov said the war between China and the Soviet Union was none of our business and that he resented our interference. At the same time pro-Soviet groups here in America got busy. For reasons not disclosed Mr. Stimson dropped the subject and it soon faded from sight in newspaper headlines. The Soviet Union is a Red nation.

Two years later the Japanese fought under strikingly similar circumstances in the same area—Manchuria. That was 1931 and Mr. Stimson was still Secretary of State. But with the Japanese fighting in the same locality under substantially the same circumstances Mr. Stimson wasn't the same at all. He did just about everything but get us into war. He shouted no end about treaties and the horrors of conflicts. He kept the front pages full of his outbursts day after day.

The mysterious circumstances which had caused him to drop the subject in the case of Soviet Russia, were somehow not operative in the case of Japan under similar conditions. Japan is an anti-Red nation.

The Kellogg Treaty by which nations agreed not to adopt a policy of war in settling disputes was signed by France in August of 1928. At that very time France was waging a serious war to subdue tribes in North Africa which had been free from time immemorial. Regardless of how the conflict began, those are the facts. France was fighting that war eight years—from 1925 to 1933. But it is not considered polite to mention it now France is allied with Moscow.

Last year Chinese aircraft dropped bombs on the International area of Shanghai, killing and wounding Americans. Regardless of whether the bombs fell accidentally or were dropped deliberately, no plane with bombs had a right to be over that area. The violation of international rights was clear.

Little was said at the time about the planes doing the damage being Chinese, and some of our papers even published pictures of the destruction with captions to let readers think Japanese were responsible. No campaign of abuse were launched by our sensationalists on the subjects, China is an ally of the Soviet Union.

Later, Chinese planes raided the Dollar liner *President Hoover* at sea, repeatedly dropping bombs which cut to pieces much of the ship's upper structure and wounded members of the crew. The attack was well out at sea and nowhere near any scene of battle. The Chinese government apologized and promised to pay damages. Little has been said on the subject since, and it is not polite to mention it. China is an ally of the Soviet Union.

Not long after that Japanese planes raided and sank the U.S.S. *Panay*, killing some of the crew and wounding others. Japan apologized and paid damages in full as soon as a bill was presented. The damage was greater than in the raid on the *President Hoover* by Chinese planes. But the principle involved was the same. There was no more nor less evidence of international offence in one case than in another. The point is that both instances of air bombings by the Chinese were excused as mere accidents and promptly hushed up by our sensationalists while similar action under comparable circumstances by the Japanese was termed deliberate and made the occasion for all sorts of war talk.

War Mongering in U.S.

Wherever we look—in whatever part of the world—we see the same actions that are readily excused for any ally of Moscow made the subject of campaigns of hate and war talk if involving an anti-Red nation. Such consistency of propaganda emphasis in all parts of the country at the same time shows two things:

One is that our campaign of sensationalism and war mongering is well organized and centrally managed. The other is that the campaign is unofficially on behalf of Moscow interest in the international scene. Obviously, the campaign enlists many persons who are in no wise aware of the game they are induced to play—exactly as some of our leading bishops, university presidents and editors were unconsciously led by British and French agents to help get us into war in 1917. Only later did these bishops, university presidents, and editors realize how neatly they had been roped.

Only in the future will some of the same crowd realize how they are again playing an international game now—a game which isn't our game. The object is to get American aid for schemers abroad. And it's not hard to see what foreign faction leads in the scheming. From such publicity sources we hear much just now about what are called the treaty breaking and word breaking nations. As would be expected, all the governments listed as such just happen to be governments which the Soviet Union considers enemies.

Since the Soviet Union wants our aid against these governments, it is a natural arrangement that our campaigns of sensationalism and hate should be so managed that we also shall consider them as enemies. But if we set aside publicity and look at the facts, treaty violating and word breaking has been no more abundant among the nations Moscow wishes us to hate than among the Soviets themselves and their allies.

(Continued on page 296)

The Future of British Enterprise in Asia[*]

Partly as a result of Chinese propaganda and partly as a result of lack of knowledge of the facts, it is sometimes thought that the changes taking place in China will be detrimental to British interests.

British interests in China include Loans, Investments, Factories, Commerce and Trade, Shipping and Banking and Insurance.

Loans.—As regards loans and indemnities secured on the Customs Revenue, the payment for these were secured as a first charge in the recently concluded Customs Agreement. As regards railway obligations, it cannot be said that railways under Chinese management have prospered. Civil wars have destroyed rolling stock and services have been interrupted. As an example of the benefits to be found in areas under Japanese influence it is only necessary to look at the Peking-Mukden railway. This railway has received much assistance from the administration of the South Manchuria Railway and has considerably benefited thereby.

Factories.—The most important British factories are the cotton mills at Shanghai—Ewo Cotton Mills, Ltd., Zoong Sing Cotton Mills, China Printing and Finishing Company. No report has been received that these have been damaged in any way. Other industrial interests include Mining, Chemical Works, Aerated Waters, Engineering Works, Repair Shops and Docks, Tobacco and Oil.

The Chairman of the Pekin Syndicate, Ltd., at the general meeting on July 6, 1938, after referring to the loss of trade from their coal mines due to the strife in North China, said :—

"Both the Chinese and, later on, the Japanese military are reported to have respected our property, and appear to have gone out of their way to see that as little damage as possible was done to it." (*The Times*, July 7, 1938).

Investments.—Professor C. E. Remer in his *Foreign Investments in China* gives the following figures for the industrial investments and loans of Great Britain and Japan :—

Great Britain	£294,600,000
Japan	£268,450,000

Comprising 36.7 per cent and 35.1 per cent, respectively, of the estimated total foreign investments.

It has been frequently pointed out by the Japanese authorities that they desire equal opportunities for all Powers in China, and that there should be opportunities for both Britain and America to make investments freely and with confidence. It must be apparent to all that if any extensive development of China is contemplated Japan must seek financial assistance outside her own island.

Monopoly in China ?

Fears have been expressed that all trade will be monopolized by Japan. For instance it has been stated in some organs of the Press that British trade is suffering from the alleged Japanese wool monopoly in North China, but as a matter of fact, in reply to a question in the House of Commons on this question, Mr. Butler, Under Secretary of State for Foreign Affairs, stated that "there is as yet little evidence of damage to British trade on this account." (*Official Report of the House of Commons,* June 29, 1938).

It has also been stated that the new Customs Tariff is favorable to Japan. Actually the foreign Powers derive more benefits from the new Chinese Customs Tariff than Japan.

Attention must also be called to the defence of the new tariffs published in Tientsin by a British paper. The *Peking and Tientsin Times* is not a pro-Japanese journal and there can be no questioning of the honesty of its views. The new tariff is simply a return to the more liberal standards that satisfied the Chinese Nationalist Government eight years ago and is not a tariff twisted and distorted to suit a special purpose. The paper says :—

"Pro-Japanese Governments could hardly be expected to introduce an anti-Japanese tariff. There is no doubt that the tariff which this supersedes came within that category. Domestic loans on a lavish scale were negotiated to meet the expenses of these campaigns. In effect Japanese importers in particular, and foreign importers in general, and the consumers were mulcted to meet the financial obligations incurred by these wars."

Two Factors in Trade Increase

It has been stated that foreign traders have difficulty in obtaining new currency in North China. Actually, as an example it was announced on May 5 that an agreement was concluded between the Federal Reserve Bank and the British-American Tobacco Company for the purchase of five million yuan notes from the Federal Reserve Bank by the British-American Tobacco Company at the rate of 1s. 2d. per yuan for the purchase of tobacco leaves.

The increase of trade and commerce in China depends on two factors. First of all the establishment of peace and order, and secondly the raising of the pitiable standard of life of the mass of the Chinese people. The establishment of the new regimes offers promise for peace and traquillity, and the development of North China under the North China Development Company and other organizations should lead, by a development of their resources, to an increase of the prosperity of the Chinese people.

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[*] From the *East Asia News Services.*

Soviet Propaganda in America

(*Continued from page 295*)

Aside from grabbing a piece of Chinese territory bigger than Manchuria and still holding it, the Soviet Union has waged eleven other military campaigns of conquest since 1918. For a list of these, consult the American Mercury magazine for April, 1938, in the article by William H. Chamberlin, formerly Christian Science Monitor correspondent in Russia and now in Tokyo.

Not only that—a firmly stated condition of America's recognition of Soviet Russia was the promise not to engage in further revolutionary activity here.

Yet at the World Conference of Soviet sympathizers in Moscow in 1935—only after a few months after Moscow's pledge to us—Soviet Union orators spoke openly in an auditorium, in the presence of American officials, and reiterated their program of world revolution, with America included.

Subject Dismissed

Our government protested this violation at the time, but pressure from red groups here seems to have succeeded in having the subject dismissed from public attention. And so now the Soviet Union, with Maxim Litvinov as spokesman, can very neatly ignore Soviet wars of conquest in both Asia and Europe not to mention other items well known in the record, and call for America to aid in world action against what he calls the treaty violators.

Regarding the Chinese war, groups eager to embroil us against Japan refer to the Chinese as among the honor nations, while Japan represents defiance of all obligations. Looking at the evidence, China's violations have been probably more numerous and wholesale than those of any other nation with which we have had regular dealings.

When Chiang Kai-shek came into power in 1927 he came in on an anti-foreign program which called for confiscating American and British property and driving us from China—ignoring the fact that our citizens there are only a fraction of the number of Chinese in this country. When Chiang's party occupied Nanking, Chinese soldiers under officers went from one consulate to another and from one foreign home to another, killing and wounding and plundering. The British consul there was shot and ours was chased over the wall in a hail of bullets.

Our entire population there was saved only when American gunboats bombarded parts of the city. For details of that, read the *New York Times* for March 25 and 26, 1927.

Economic Reconstruction in China*

SINCE the Japanese forces have completely occupied Shanghai and its vicinity and placed the whole region of the lower stream of the Yangtze under their control, it is quite natural for Japan not to admit the existence of any organ of the Kuomintang government within that region.

The problem of taking over the maritime customs and the postal administration by Japan was first studied by the Japanese authorities in that part of China. As the initial step, Suemasa Okamoto, Japanese consul-general at Shanghai, and Major-General Kumakichi Harada, resident officer in Shanghai, met C. S. Franklin, Chairman of the Shanghai Municipal Council, and other leaders separately on November 20, last year, after the complete occupation of Greater Shanghai, and made Japan's intention clear from their respective official standpoints.

The negotiations had to be held, however, with the British authorities and the Inspector-General of the Shanghai Maritime Customs, because the authorities of the Shanghai Municipal Council were not in a position to deal with this problem at their own discretion. In her negotiations with the British authorities, Japan proposed to deposit the customs revenues with the Yokohama Specie Bank, in order to prevent them from falling into the hands of the Chiang regime, and to place the Shanghai Maritime Customs under the control of the Japanese troops in order to maintain strict surveillance over the transhipment of arms bought by the Kuomintang government through the Shanghai Maritime Customs.

Japan also proposed that the number of Japanese customs officials be increased and that they be employed in key positions in the maritime customs. Both of the proposals were reasonable and there was little room for dispute when the actual situation in the region on the lower stream of the Yangtze was taken into consideration. The Western authorities, however, failed to agree to Japan's proposals. The deal was not expedited as speedily and as smoothly as had been desired.

The counter-reply sent by the British Government under date of November 27, last year, contained what might be considered a protest. The opposition was based on the apprehension that the depositing of the customs receipts with the Yokohama Specie Bank would mean the suspension of the payment of foreign debts secured by the revenues of the maritime customs. Such a fear was entirely due to misunderstanding.

Conference Deadlocked

With regard to this point, Japanese representatives repeatedly stated that Japan would hold herself responsible for the payment of foreign credits made with the customs as security. The Western side, however, failed thoroughly to appreciate Japan's offer and the negotiations in Shanghai were deadlocked. Negotiations were thus removed to Tokyo to be held between Japan and Britain, which country enjoys a monopolistic control over China's customs.

The parley opened early in March, this year, between Sir Robert Craigie, British Ambassador to Tokyo, and Kensuke Horinouchi, Foreign Vice-Minister, joined by E. L. Hall-Patch, financial adviser to the British embassies in China and Japan, who came to Tokyo from Shanghai. Britain finally grasped Japan's true intention and an amicable agreement was signed on May 3, this year, marking the solution of the prolonged issue over the Chinese maritime customs in the Japanese-occupied areas.

The restoration government of Nanking appointed Li Chien-nan, Finance Department authority on taxation, the director of the Shanghai Maritime Customs to replace Kiang Hai-kuan, who was appointed by the Kuomintang government. The customs were officially taken over by the restoration government on May 6.

When the maritime customs in North China were taken over on December 15, last year, by the provisional government of Peking, immediately after its establishment, Great Britain maintained an attitude of being unaffected. Great Britain, however, stubbornly maintained an antagonistic attitude in connection with the problem of the Shanghai Maritime Customs and six months were required before the issue was settled.

The attitudes of the third-party notions toward the current Sino-Japanese conflict can be observed behind the circumstances in which Britain finally altered her stand to agree to Japan's proposal. It cannot truthfully be said that Central China and North China have the same conditions. But judging from the actual situation created by the Imperial forces' occupation, it might be observed that Central China should have followed the example of North China sooner.

Why was the change not made as speedily as desired? It was due to Britain's determination to maintain her monopolistic control over the Chinese customs, coupled with her delicate relations with the Kuomintang government.

It ought to be considered that Britain worked out measures to defend her rights, by deferring the negotiations as long as possible, while on the other hand making efforts to persuade the Kuomintang government to bow to what is inevitable.

Japan's Stand Impartial

As there was an item which showed Japan's impartial attitude regarding the treatment of foreign loans, the financial circles of London, as reported in a *Domei* dispatch dated May 3, favorably received the Anglo-Japanese agreement concerning the transfer of the Shanghai Maritime Customs. It was also reported that Chinese bonds and the stocks in China companies rose by three or four points.

The United States and France, which feel no small concern regarding loans and credits, have tacitly indicated that they would take joint action with Britain. On the other hand, Britain, apparently assuming the rôle of a representative of the two countries, has declared in a statement that neither America nor France has any intention of opposing the conclusion of the Anglo-Japanese agreement.

The contents of the Anglo-Japanese agreement are:

(1) In addition to the Shanghai Maritime Customs, the agreement will be applied to all the maritime customs in the Japanese-occupied area.

(2) All revenues collected by the customs at each port within the areas under Japanese occupation will be deposited with the Yokohama Specie Bank.

(3) From the revenues thus deposited, foreign loan quotas will be remitted to the inspector-general of customs.

(4) The payment of indemnities and foreign loans will be treated as the first charge against the revenue, after deducting the maintenance expenses of the customs administration and certain payments and grants. The foreign loan quotas for each port will be determined monthly in proportion to the share of that port in the total gross collection from all ports during the preceding month.

(5) The agreement will be a provisional measure in effect during the period of hostilities.

Item No. 1 outwardly concerns Japan, but it may be said that Britain has recognized the confrontation between the old and new regimes in China because the maritime customs were in reality taken over by the new regime. In effect, the Kuomintang government has been declared to be local in status.

Change is Significant

The replacement of the Hongkong & Shanghai Banking Corporation by the Yokohama Specie Bank in item No. 2 also has significance.

Originally the customs revenues were deposited with the Chinese banks and, by the order of the Chinese government, they were transferred to certain banks in Shanghai to be used as the fund for the redemption of foreign loans. As there was apprehension that the customs revenues would be confiscated by the revolutionary force in 1911, an international banking committee was established in Shanghai and the Hongkong & Shanghai Banking Corporation, backed by British capital, and two other banks, one Russian and the other German, took charge of the customs revenues.

After the European war, the German and Russian banks were disqualified and only the Hongkong & Shanghai Banking

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*From the *Osaka Mainichi*

Corporation handled the customs revenues. Subsequent to the establishment of the Kuomintang government, the customs revenues were taken over by the Central Bank of China, under the direct control of the Kuomintang government, but again the task was entrusted to the Hongkong & Shanghai Banking Corporation following the outbreak of the current China Emergency.

Item No. 3 and the other represent the fair and impartial attitude of Japan. The favorable effect seen in the financial and banking circles of London was largely due to these items.

It is reported that Great Britain tried to have the Shanghai Maritime Customs made responsible for the redemption of domestic bonds. Such a question, however, will become a problem to be considered by the restoration government of Nanking only after the Chinese financial circles, centering around Shanghai, have come fully to understand the mission of the restoration government and have offered their co-operation.

The maritime customs revenues are one of the most important financial sources of the Chinese government and they have been regarded as the best security for the issuance of foreign and domestic bonds. The foreign and domestic bonds and the indemnities backed by the customs revenues reach a huge amount. A combined figure of £52,443,901, U.S. $57,722,363 and 3,353,493,016 yuan represents the figure with interest added. This amount is scheduled to be paid in full by 1960. Of the figure, the foreign bonds represent £25,710,885 in sterling loans and $28,990,150 in U.S. dollar loans.

The maritime customs at Shanghai, Tientsin and Tsingtao, which occupy respectively from first to third place in the amount of customs revenues, and the maritime customs in North China as well as those on the lower stream of the Yangtze are under the new China regime.

Below are the receipts at leading maritime customs houses in 1936 and 1937 (Unit, 1,000 yuan):

(A.) UNDER NEW REGIME

(Provisional government of Peking and restoration government of Nanking)

	1936	*1937*
Shanghai	148,870	142,110
Tientsin	35,520	33,390
Tsingtao	20,310	24,310
Chefoo	4,600	3,730
Chinwangtao	1,240	1,610
Amoy..	5,460	5,300

(B.) UNDER KUOMINTANG GOVERNMENT

Hankow	23,880	25,830
Canton	10,920	12,850
Kowloon	9,120	16,480
Swatow	6,830	8,940

Note: The maritime customs at Swatow are now practically closed, due to the occupation of Nam-ao island by a Japanese naval landing party on June 21, this year.

When the trade amount of all China for the first quarter of this year is roughly classified into the four districts of North China, Shanghai, Central China, and South China, it can be easily understood that the center of China's foreign trade, affected by the emergency which is still continuing, has been shifted to South China, where Hongkong, the only safety zone, is situated.

In the table below the unit is 100,000 yuan:

IMPORTS

	Jan.-Mar., 1938	*Jan.-Mar., 1937*
North China	358	393
Shanghai	528	1,650
Central China	39	259
South China	1,391	414

EXPORTS

North China	332	686
Shanghai	336	1,252
Central China	6	16
South China	667	444

The above table is, however, nothing other than figures which show the transitional and abnormal phenomenon under the emergency. It is expected that this abnormal trade situation will return to that seen before 1937, when China's economic power is reconstructed in connection with the restoration of peace and the maintenance of order after the war is over. A bright future is expected for the trade relations between Japan and China.

Tariff Revision

The revision of the tariff rate was the next economic problem after the taking over of the maritime customs.

The Kuomintang government acquired customs autonomy in 1929 and instituted its tariff rate in 1931. It was generally regarded as fair, having no anti-foreign color. The Kuomintang government, however, adopted an anti-Japanese policy and resorted to the revenue increase principle upon the sudden change of the political situation following the Manchurian incident of September, 1931, and the Shanghai incident of January, 1932.

The Kuomintang government established an anti-Japanese trade barrier in July, 1934, in an effort to check the importation of Japanese goods.

The revision of the anti-Japanese tariff rate was one of the most vital pending questions. In January, this year, the provisional government of Peking carried out the first tariff revision, following its taking over of the maritime customs in North China, with Tientsin as the center.

The step was merely an emergency expedient, chiefly for the economic rehabilitation and relief of the Chinese masses, who were greatly impoverished. Accordingly, it was expected that a uniform revision of the tariff rate effective for Central and South China would soon be carried out.

The provisional government of Peking and the restoration government of Nanking thus effected, after careful negotiations, a drastic revision of the Chinese customs and the new tariff rate was instituted on June 1, this year.

The salient points of the new tariff rate are:

(1) The new import tariff as a rule adopts the tariff regulations which were put in force on January 1, 1931, by converting them into the metric system. Part of the revised tariff, which was promulgated by the provisional government of Peking on January 20, 1938, is also adopted to be effected uniformly in North and Central China.

(2) The export tariff rate of the revised customs of Janaury 20 of the provisional government of Peking has been adopted in its entirety. It applies also to the Shanghai area.

(3) As to the transfer tariff, the schedule enforced in the Shanghai area by the Kuomintang government on October 1, last year, is adopted, applying also to the North China area.

Rates Cut by 30 Per Cent

It may be said that the new import tariff, which left part of the tariff rate of the provisional government of Peking unchanged and which named provisional duty-free goods, has adjusted the preparations for the development of the mineral resources in China and the rehabilitation of the agrarian villages. With the revision of the 1931 customs tariff, an average reduction of about 30 per cent was made in all items. The anti-Japanese rates were entirely removed with the institution of this new tariff.

The fact that the areas under the jurisdiction of the provisional government of Peking and the restoration government of Nanking were completely placed under a unified customs tariff signifies that the economic relations has preceded the political relations. In estimating the results and effects following the institution of the revised tariff rate, great care is necessary.

The January revision of the customs tariff by the provisional government of Peking was criticized by Britain, America, France and other countries on the ground that it destroyed the unification of the Chinese maritime customs.

The conclusion of the Anglo-Japanese agreement concerning the transfer of the maritime customs in the Japanese-occupied area and the enforcement of the unified tariff rate, however, have clarified Japan's intention to prevent the unified customs duties in China from being disturbed.

(*Continued on page 301*)

The Whangpoo and Other Estuary Channels*

By ***BRYSSON CUNNINGHAM,*** *D.Sc., B.E., F.R.S.E., M.Inst.C.E.*

In designing the improvement of the Whangpoo River on which stands the ill-fated Port of Shanghai, the Whangpoo Conservancy Board adopted a width of 1,400-ft. at the upper end of the harbor expanding to 2,400-ft. at the mouth. Training walls, consisting of pile-work, fascine-work, caissons and stone rubble, were built in many places. The former ship channel, lying to the right of Gough Island, was closed by dams, and the left arm of the stream selected for improvement into a serviceable waterway. The great difference between the charts of 1906 and 1935 can be seen in the two maps. In two places, the river was too narrow and was widened by dredging, involving the removal (including deepening operations) of about 60,000,000 cu. yds. of mud.†

Although, as has been pointed out, the installation of training walls will, in addition to regulating the course of the waters in the estuary, at the same time, by the induced scouring action, tend to produce a deepening of the bed, yet the process may be slow, and if the channel be unduly shallow, or if the banks or sills of indurated material be encountered, it may be necessary to institute dredging operations, in addition, in order to hasten the action and assist in promoting an improvement. The speedy deepening of the channel has the further advantage that it enables tidal water to enter the estuary in greater volume, and so compensate in some measure for any reduction in tidal capacity, which may result from training works accompanied by land reclamation. Moreover, dredging is of assistance in concentrating the flow in the line of the selected channel.

Shallow Channels

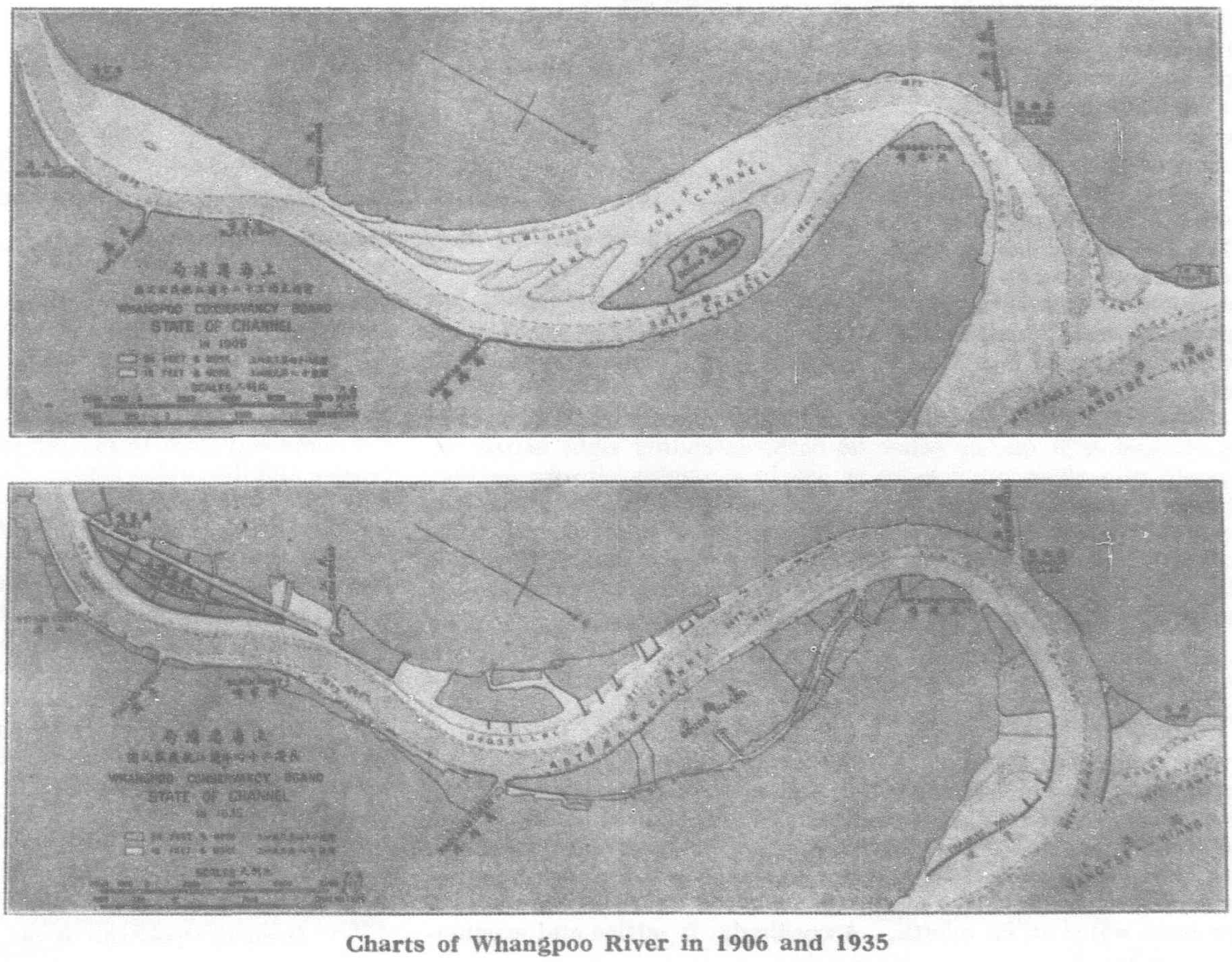
And here we come to the second kind of defect in estuaries to which we have referred, viz., that of a bed too shallow for the needs of navigation. Developments in ship design and construction are constantly entailing provision for deeper draught of water which, unfortunately, is not naturally available in many rivers, so that recourse has to be had to artificial deepening. The most speedy and direct method of achieving an increase in depth is, as stated, by means of dredging, and operations on an extensive scale are more or less continuously in hand at most ports of commercial standing, which are located in rivers and estuaries. Except in the case of sills, or patches, of hard material, which, once removed, have no tendency to reform, dredging in the majority of cases, certainly in sandy and muddy estuaries, is a constantly recurring necessity, differing in this respect from training works which are of a permanent and enduring character.

Dredging appliances are numerous and vary greatly in design and capability. For light, sandy soils, the sand pump, or suction dredger is, undoubtedly, a most suitable and efficient machine, and it is capable of removing large quantities in a short space of time, but if the material be very fine and silty, much of the quantity pumped may be lost through escape overboard. For denser and stiffer material, such as clay, gravel and marl, the bucket or ladder dredger is better adapted, and, indeed, a bucket dredger is a very capable all-round appliance for the majority of situations. The scope of the suction dredger has been greatly increased by the introduction of rotating cutters at the foot of the suction tube, so that material of an argillaceous character can be disintegrated to a degree compatible with its passage in suspension through the pump. Time does not permit of entering into a comparison of the various types of dredgers and their performances, and we will content ourselves with a simple illustration of actual channel dredging operations.

The Thames Estuary

The approach channel to the Port of London through the estuary of the Thames has been formed and is maintained solely by dredging without the aid of artificial works. The channel is known as the Yantlet Dredged Channel; its position is shown on the plan. This channel has superseded a former natural channel tending to the North, called Leigh Middle, which at one time occupied a predominant course in the river. The Yantlet Channel was laid out in the early days of the Port Authority, and was completed in 1924. It has a width of 1,000-ft., and a standard depth of 30-ft. at L.W.O.S.T. The same width and depth are maintained as far as Erith, making a total length of 32½ miles from the Nore. From Erith upstream, the channel undergoes reductions in depth and width in a series of stages.

A large fleet of dredgers and attendant vessels (over 30 in number at one time) was engaged on the river development, but since the program was completed the number has been reduced to half a dozen craft. About 80 per cent of the improved channel



Charts of Whangpoo River in 1906 and 1935 is virtually self-maintained. Two large bucket dredgers, are important units in the dredging fleet. They are capable of dealing with conglomerate, chalk, gravel, greensand and stiff clay in addition to alluvium, sand and silt.

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*The 1937-8 Vernon-Harcourt Lecture of the Institution of Civil Engineers, delivered at the Institution on December 8, 1937, and Subsequently repeated at Manchester, Newcastle, Sheffield, Birmingham, Glasgow, Belfast, Cardiff, Bristol and Southampton.

† The Port of Shanghai (9th edition) Whangpoo Conservancy Board, 1936.

The River Clyde affords another and striking instance of a navigable channel improved and developed almost entirely by dredging operations, though in the early stages, training works were constructed for the purpose of contracting and straightening the bed. Prior to the nineteenth century, the Clyde was merely a shallow stream, but in 1870, after works had been carried out, vessels of 22-ft. draught were able to get up to Glasgow, the average depth between Port Glasgow and the River Cart being then 18-ft. below low water level. By the year 1914, this had been increased to at least 24-ft., and at the present day the river channel is being maintained at a depth of from 25-ft. to 27½-ft. at average L.W.O.S.T. so as to give a depth of 37-ft. 6-in. at high water.

A remarkable fact in the history of the Clyde is that, owing to the progressive lowering of the low water mark at Glasgow Harbor, it has been necessary to dredge to 36-ft. below the low water mark of 180 years ago, in order to obtain a depth of 25-ft. below the low water mark of to-day.

River widening works have been undertaken from time to time in order to improve the bends and provide greater manœuvring space for tugs accompanying large vessels. One of these widenings at present in hand involves the removal of 800,000 tons of material.

We now proceed to discuss the third and last important defect of certain estuaries, viz., that of a bar.

Bars are a notable feature of tidal and non-tidal rivers alike, but they are by no means universal. They are mainly found in connection with tidal rivers; less often in connection with non-tidal rivers. On the other hand, some tidal rivers and a great number of non-tidal rivers possess channels which, while they may be encumbered with shoals, are free from the pronounced obstruction of a bar. The Mersey, the Dee and the Rhone are afflicted with bars of an undubitable character; the Thames, the Humber and the Severn have channels which find their way into the sea, perhaps through tortuous routes, but without encountering a serious obstacle of this kind.

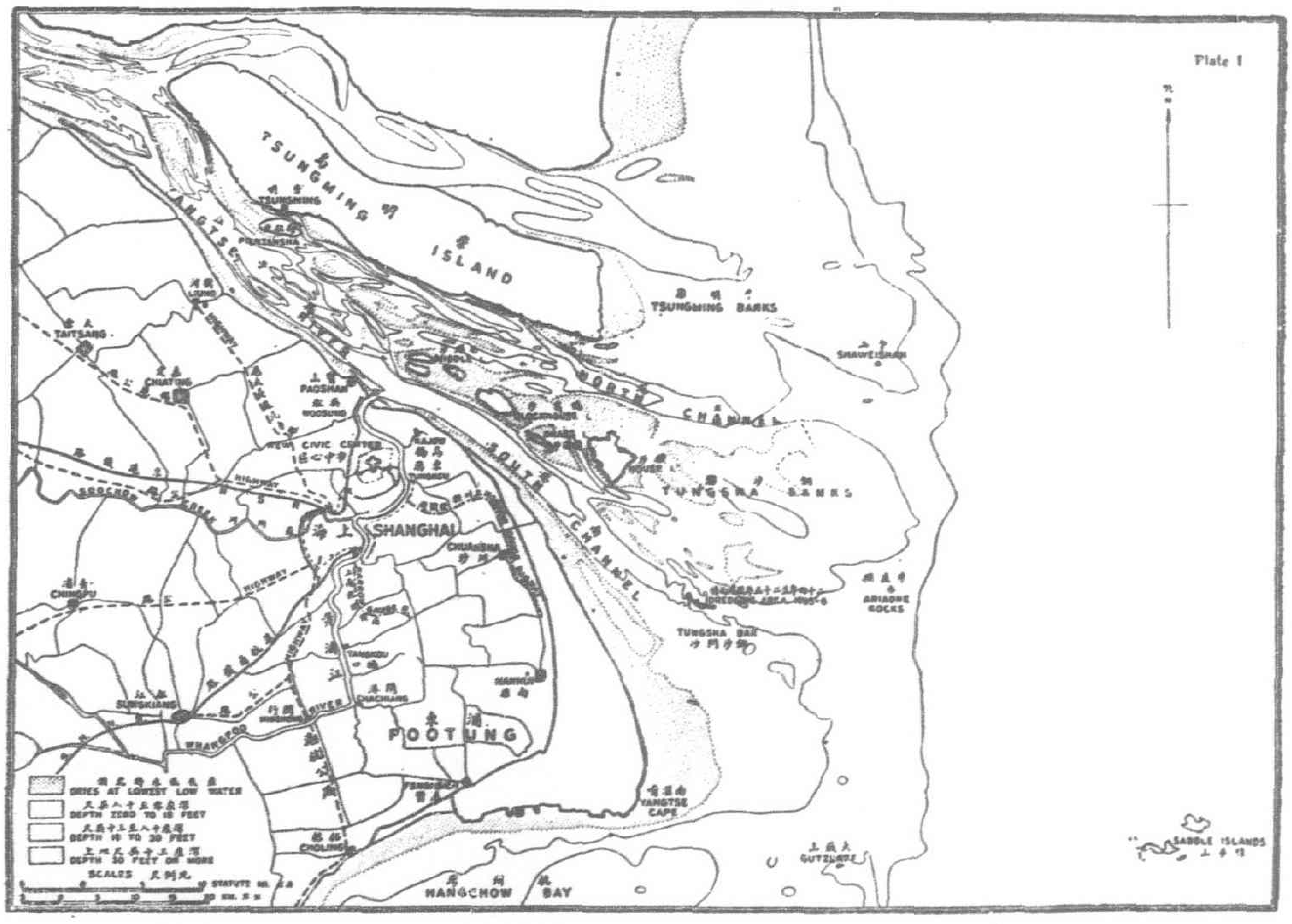

Chart showing the approaches to Shanghai

A bar may be described as a ridge or narrow plateau, or even a succession of one or other or both, extending right across the mouth of a river, often more or less in a roughly circular outline, forming an elevated mound rising somewhat abruptly above the general level of the sea floor on one side and of the river bed on the other. It is only when the bar rises to such a height as to reduce the depth of water below the requirements of shipping that it demands treatment as an obstruction to navigation.

Origin of Bars

The causes and origin of bars have been much debated and very conflicting views have been expressed on the subject. All rivers are more or less silt-laden, and most of them convey to the sea enormous quantities of detritus and alluvium which have been eroded in passing through their basins. While readily transportable by the normal force of the current in the river's downward course, the material is no longer so mobile when the river encounters slack or inert water at its mouth. Accordingly, it settles and accumulates, and in the case of tideless seas produces the peculiar deltaic formation so well illustrated by the mouths of the Nile and other Mediterranean influents. But this phenomenon, though sometimes adduced as a reason for the creation of bars, is not an adequate explanation of bars in tidal rivers, where the interplay of ebb and flow not only provides no prolonged period of slack water, but even changes daily the locality of the tidal nodes where slack water momentarily prevails.

A theory has been put forward by a distinguished port Engineer, now some time deceased (a former President of the Institution), in a Paper* read before the British Association in 1895, that bars are merely the natural fan-shaped contouring of a river outlet. Taking as his illustration the simplest form of channel coursing through banks of sand and forming a right-angle with the contour of the outer slope, Mr. A. G. Lyster said "the general fall, or slope, of the banks will be radially from apices near the center of their areas on either side of the channel, and their slopes will be considerably increased in the immediate neighborhood of the channel. The intersection of a channel of the section shown in the diagram with the outer slopes of the bank, would, if it were effected by human agency, and a uniform section maintained throughout, result in a "groyne" or curved line of intersection, represented by A, B, C. When, however, in the case of rivers, the formation of the channel is effected by hydraulic agency, it must, as a result of natural laws, take a different form. Supposing the volume retained by the channel to be constant throughout its length down to a line of section drawn across the channel from A to C, it will be obvious that below that point, the waters which it carries can escape laterally across the line of intersection A, B, C, before referred to; consequently, if a number of sections be considered between A, C and B, there will clearly be less water available for the maintenance of each successive section between those points; and, taking into consideration the relations of the velocity and material in suspension, there must be as a consequence a gradual reduction of sectional area and, consequently, a rise of the bottom of the channel between A, C, and B."

I have given the explanation verbatim in the writer's own words, since it carries weight in view of his long experience of the Mersey Bar, but I am bound to say that it is a theory which does not commend itself to my judgment, for it takes no account of the erosive and dispersive action of the currents in tidal waters. Moreover, the rise in the bed of the channel at the bar is not gradual, as implied in the theory above stated, but generally abrupt.

Other authorities have attributed the formation of bars to wave action, apparently ignoring the fact that storms are intermittent and, for long periods in the summer season somewhat rare, so that a bar formed by wave action would have abundant opportunity to subside and dissipate, whereas the natural condition of most bars is fairly stationary.

The most satisfactory general explanation which I have seen put forward, at any rate for river mouths in Great Britain and on the Atlantic littoral, is that which connects the bar with the phenomenon of littoral drift. Passing continuously along a coast-line, the drift trails across the mouth of an intervening river in a track, the position of which is determined by the joint action of the river and sea currents. This explanation would appear to be supported by the nature of the materials of which a number of bars are composed. If of a fluvial origin, the material at the bar would be mainly silt and alluvium. The Mersey Bar consists almost entirely of free sand of varying degrees of coarseness : that on the outer slopes being finest and mixed with mud, the coarsest and cleanest being found on the inner slopes. The bar of the Gironde abounds in marine shells, mixed with gravel and sand, such as are common on the dunes and foreshore of the French Atlantic Coast. In this case, the difference in the material dredged from the outer and inner slopes is even more notable. On the exterior side of the bar, the elements are coarse, and comprise a large proportion of shells. Towards the center, the materials become progressively smaller and finer, especially the siliceous particles of sand and shingle. Then, on the inner face, the bulk is composed of dune sand, often covered with a fine grey sand, which indicates a reduction in the velocity of the currents, once they have crossed the obstacle formed by the bar. There is no difference in chemical composition in the various elements, merely a grading, in accordance with their susceptibility of movement under the motive power of natural forces.

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* "Dredging Operations on the Mersey Bar" by Anthony G. Lyster.

The Yangtze Bar

The theory connecting bars with littoral drift is not of universal application, for there are bars, such as those of the Yangtze River, which are largely mud, mixed here and there with patches of elutriated sand, which Dr. Herbert Chatley points out have a definitely fluvial origin. The entrance to the Yangtze is shown on the outline map. The South Channel, the main shipping route, is almost straight. The bar, generally known as the Fairy Flats, is of considerable extent, over two miles wide, and the length in which it affects deep-draft ships is about 20 miles. Over the crest of the bar there may be at times only 18-ft. of water. The policy pursued by the Whangpoo Conservancy Board has been to dredge a navigable channel, 1,000-ft. wide, with a depth of 9-ft. below the crest.

Other exceptional instances of bar formation must be mentioned. There are in certain rivers, bars of indurated material of a permanent character, such as rock, boulder clay and conglomerate. These evidently have a remote origin and are due to primeval geological causes.

While it scarcely seems possible to find a single comprehensive solution of the problem of the existence of bars, the main point to an engineer is the practicability of their removal, or truncation to a level consistent with safety of transit by shipping, and here recourse is again had to dredging and to training works.

Bar Dredging Plant

The conditions of dredging operations are much more exacting at an exposed situation, such as the estuary mouth, and they are subject to more frequent and prolonged interruptions due to bad weather. In particular, the pipe of the suction dredger, or sand pump, is very vulnerable, rendering it difficult, and often impossible, to work on account of a swell. With the aid of telescopic pipes and flexible joints, however, much has been done to enable suction dredgers to adjust themselves to the rise and fall of the sea, and to be independent of moderate variations of level. The *Pierre Lefort* working on the bar at the entrance of the Gironde, has shown herself capable of functioning when waves exceeded 11½-ft. in height from trough to crest, and, even at times, when they reached 13-ft. Monsieur Lévêque, the Engineer-in-Chief and Director of the Port of Bordeaux, records that waves frequently broke over the bows of the vessel, which were no less than six to nine meters (say 20 to 30-ft.) above the water line, according to the depth to which she was loaded.

The nature of the articulations in the two suction pipes of the *Pierre Lefort* is of interest in showing how so great a range of action is maintained in a rough sea.

The *Pierre Lefort* is a dredger of the Trailing Suction Flexible Head type with a hopper capacity of 2,610 cu. yds., and a dredging rate of 3,300 cu. yds. per hour, working in material of varied character. It is designed for a maximum dredging depth of 65-ft. and the I.H.P. of the Diesel electric pumping engines is 2,000. It was built by the German firm, Deschimag, in 1934.

More recently, a larger suction dredger, the *Chien She*, has been built by another German firm—Schichau—and supplied to the Whangpoo Conservancy Board for work on the Yangtze Estuary. It is of the Drag Suction Scooping Head type, and has a hopper capacity of 3,700 cu. yds. The dredging rate is 8,000 cu. yds. per hour, working in firm mud, which includes as much as 60 per cent of hard sand. The dredging depth is 45-ft., and the machinery is steam driven with pumping engines of 2,400 I.H.P.

Due note must also be taken of the *Leviathan* in the service of the Mersey Docks and Harbor Board and working on the bar of the Mersey. Built so far back as 1909, it is still the largest suction dredger in existence, with a hopper capacity of 6,700 cu. yds., though its rate of working, 8,000 cu. yds. per hour is only about the same as that of the *Chien She*. It is a fine vessel, 465-ft. long, built by Cammell Laird of Birkenhead, steam driven with pumping engines of 2,800 I.H.P. and capable of dredging to a depth of 70-ft. in the free sand of the Mersey Bar.

Economic Reconstruction in China

(Continued from page 298)

What made the third-party nations uneasy in regard to the revision of the customs tariff was the belief that a rate advantageous to Japan would be instituted as a reaction to the Kuomintang government's anti-Japanese tariff.

Suggest New Policy

Such was a baseless apprehension. The new rates are extremely advantageous to all interested nations as well as to Japan.

Japan's economy has such great power that it has advanced even in the face of anti-Japanese discrimination. Japan is therefore fully capable of carrying on her commerce successfully without enjoying any advantage over competing nations. The impartial and appropriate revised tariffs, based on the 1931 customs rates, were therefore put in force, though they are not of a permanent nature and should eventually be revised so as to establish a far more rational system of maritime customs than that in effect to-day.

While fighting, Japan has completed requisite economic preparations, such as the taking over of the maritime customs in the occupied area and the revision of the anti-Japanese tariff.

These economic measures are seen as important in that they suggest the new policy to be adopted by reconstructed China, with regard to her economic development, the economic relations between Japan and China, and foreign capital.

Admiral Uriu's Last Letter to an American

(Continued from page 293)

and other acts of violence against Japanese. During all this while Japan tried her utmost to settle her differences with China in a spirit of friendly collaboration. The already serious situation was made worse when the communists came into the scene. You will recall that the Reds were Nanking's avowed enemies for 10 years.

Japan is in the midst of a costly campaign. The very fact that we are prepared to pay the costs should be eloquent proof of the seriousness with which we desire peace and security in East Asia.

If this explanation of the problem, done in all humility, can convey to you something of the real significance of the present strife, I would be very contented. If you can sense the justice of our position, I hope you will be so kind as to make copies of this letter for all the members of our class.

This is a serious crisis and I hope that America will view it with impartiality, for peace cannot be promoted by taking sides. It depends upon constructive co-operation to remove the cause of friction and conflict.

I hope I shall be hearing from you soon, with kindest regards,

I am, as ever,
Your devoted friend,
S. Uriu.

Coal Handling Plant on the Lunghai Railway

By G. F. WHITEWAY, Fraser & Chalmers Engineering Works of the G.E.C.

THE construction of the important Lunghai Railway of China (which at the time of writing was one of the main objectives of the Japanese forces in China) has been directly and indirectly responsible for much of the industrial development of China in recent years. The need for adequate shipping facilities at suitable ports connecting with the railway was early recognized as being of extreme importance. Thus the development of the port of Lian Yuen, at the junction of the railway with the Yellow River has provided a means of receiving coal by railway from an important group of mines, storing it and exporting it direct via the river in ocean going vessels.

The scheme originally planned for a complete self-contained coal intake, handling, storing and shipping plant, having its own electrical power derived from steam plant, was adopted in 1934, and the contract for the supply and erection of such a plant, together with a power station and wharf facilities, was awarded to The General Electric Co., Ltd., the mechanical and structural portions of the work being undertaken by the company's Fraser & Chalmers Engineering Works. It is proposed in this article briefly to describe the equipment installed.

Power Station Plant

Two 700 kva turbo-alternators are installed in the power station (fig. 1), each consisting of a high-pressure impulse turbine running at 6,500 r.p.m. and driving through reduction gearing a 3,300-volt, three-phase, 50-cycle, 1,500 r.p.m. alternator (fig. 2). The turbines are supplied with steam at an admission pressure of 192 lb. per sq. in., and at a temperature of 635°F. The turbines exhaust into surface condensers mounted in the basement below the turbines, and the circulating and condensate extraction pumps are driven through gearing by an auxiliary turbine, the circulating water being re-cooled in spray cooling plant capable of dealing with 50,000 gallons per hour.

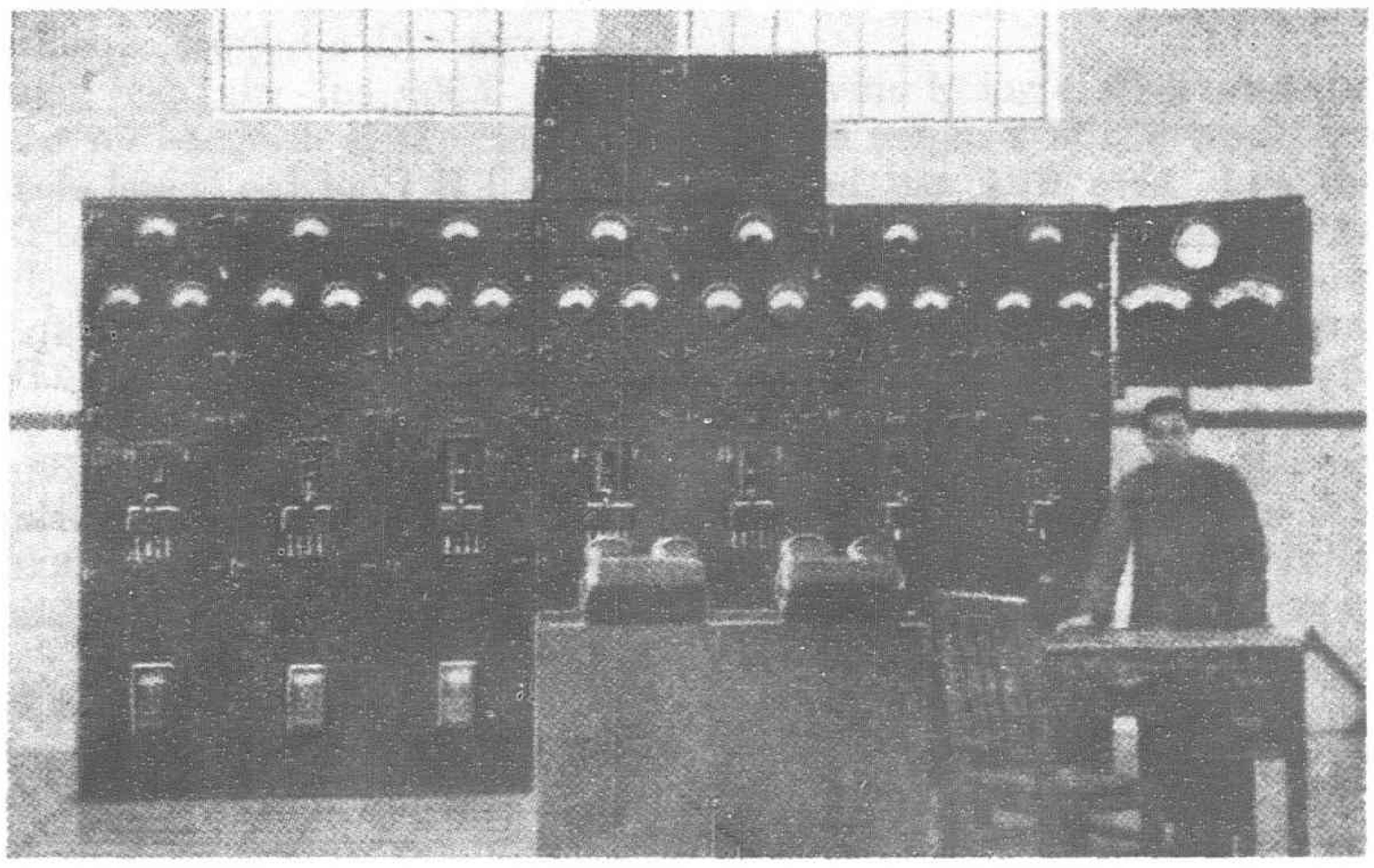


Fig. 3.—3,300-volt sheet steel cubicle switchboard controlling the alternators and feeders

Steam is generated by two Babcock and Wilcox water tube boilers each having a heating surface of 1,790 sq. ft., and equipped with integral superheaters, mechanical chain grate stokers, economizers and induced draft fans.

For the control of the two alternators and five outgoing feeders, a 3,300-volt 7-panel sheet steel cubicle switchboard is installed (fig. 3), one of the feeders supplies a 380-volt flat-back switchboard through the medium of a 125 kva 3,300/380-volt transformer. This board controls the feeders to the various sub-stations and sub-distribution boards of the coal handling plant.

Coal Storage and Shipping Plant

The comprehensive coal handling plant installed consists of a system of interconnected belt conveyors as shown in the diagram, fig. 4, with provision at one end of suitable means for receiving rail borne coal, and at the other end, for loading the coal into ships, with ample storage facilities between these points. The plant is designed to deal with run-of-mine coal at a maximum rate of 400 tons per hour, delivering it either into storage, from train to ship or from storage to ship. The railway wagons in which the coal arrives are of wood or steel construction, ranging in capacity from 10 to 40 tons. Each train as it arrives is shunted on to a track adjacent to the ingoing end of the plant and leading to a 60-ton Marshall wagon tippler. The coal wagons are then uncoupled and separately hauled by electric capstan into the tippler which empties them, after which an electric capstan hauls the empty wagons on to a tail track, whence they are later hauled away by locomotive.

Wagon Tippler

The arrangement and operation of the wagon tippler are illustrated in figs. 5 and 6. It is of interest that this tippler is the

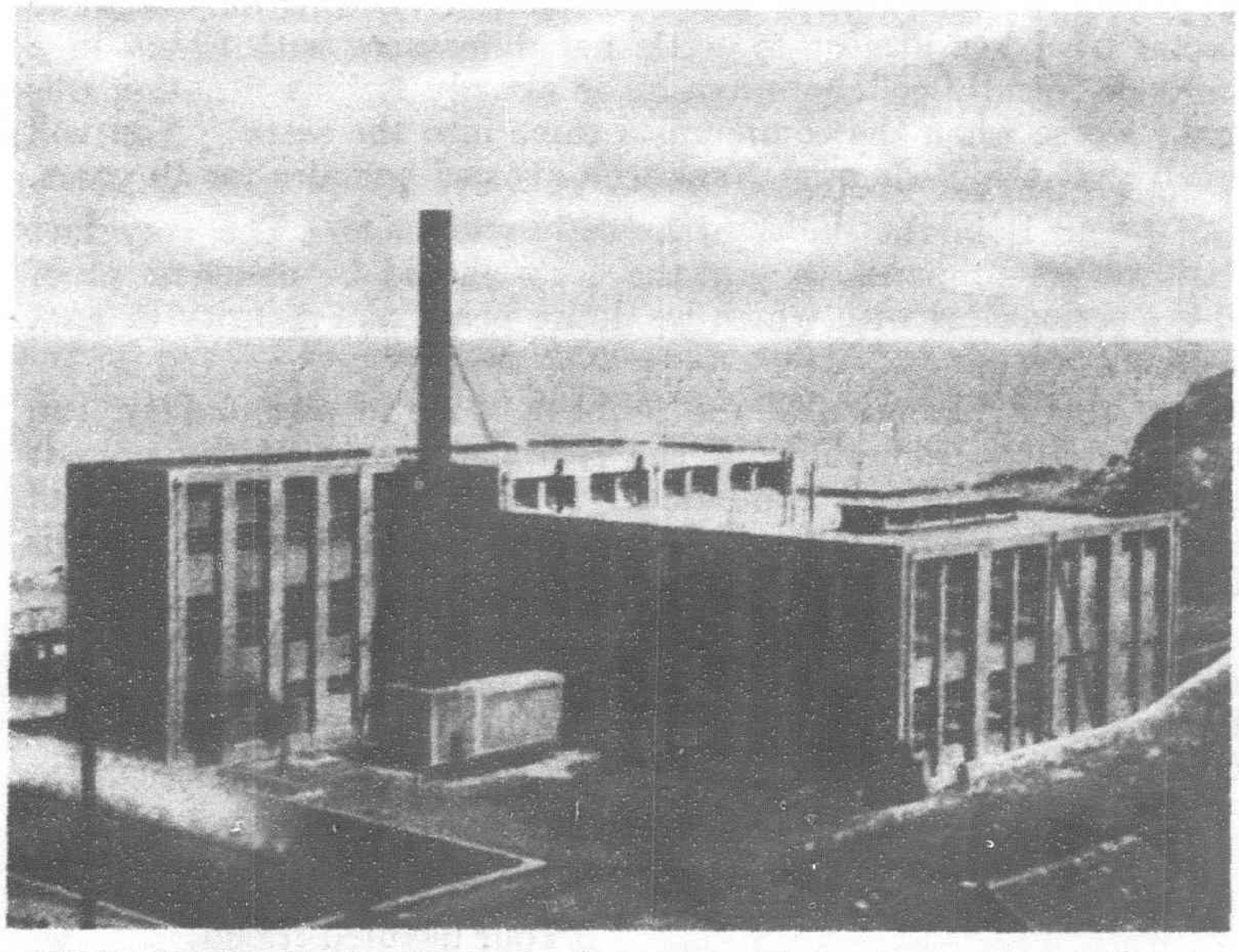


Fig. 1.—General view of the power house on the Yellow River, China

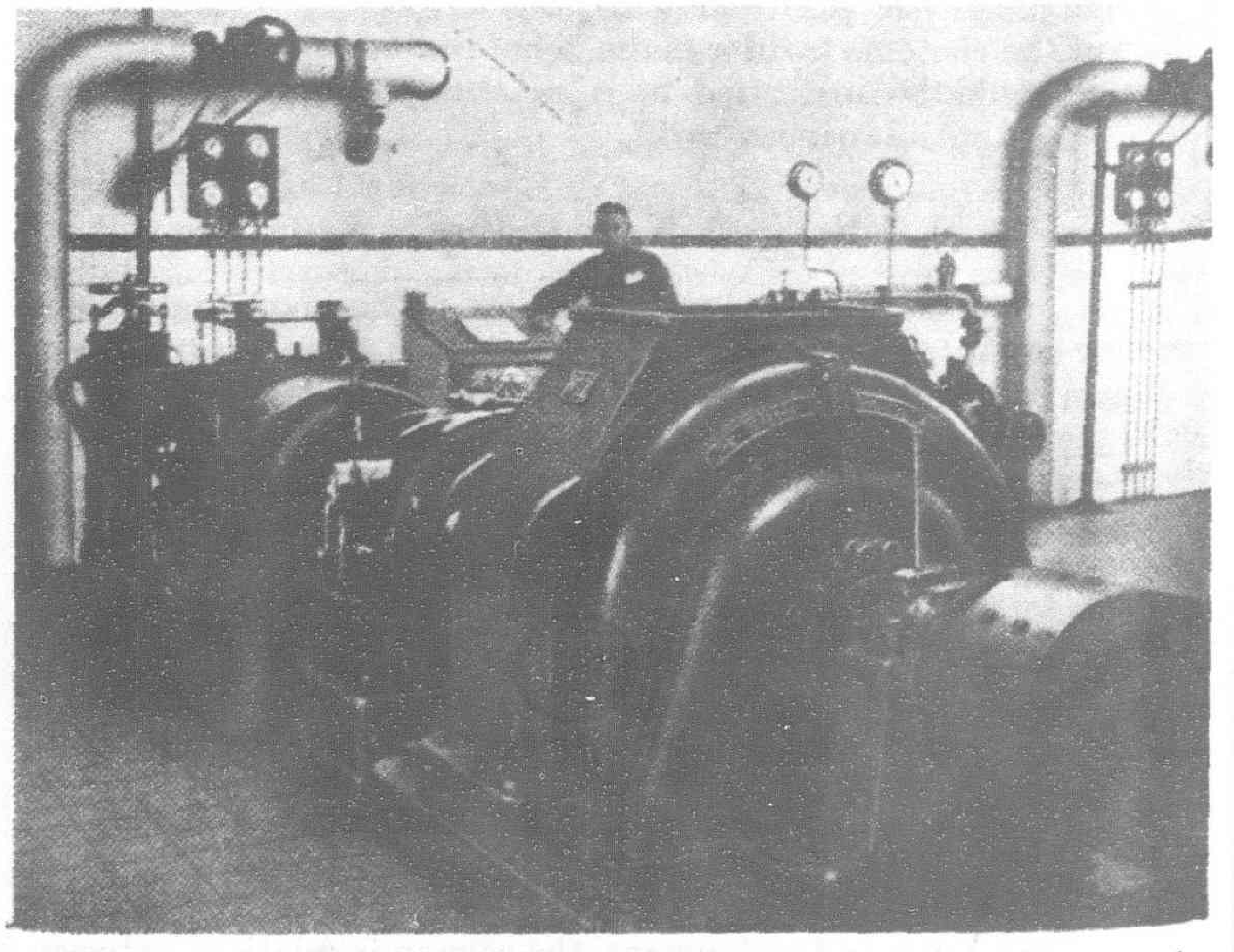


Fig. 2.—One of the two 700 kva, 3,300-volt, 1,500 r.p.m. Geared turbo-alternators installed in the power station

largest ever manufactured in England, and is capable of handling a 42-ft. 8-in. wagon with a content weighing 40 tons and a tare of 18 tons. It is thus rated as a 60 ton machine. Special consideration has been given to the design of the tippler to make it suitable for handling wagons of rather light construction such as are used on the Lunghai Railway without causing them any damage.

The tippler briefly comprises a wagon platform mounted on two hinged arms. The platform is raised and turned over by steel ropes connected to a double-barrelled counter-balanced winch mounted on a steel frame at a suitable height above the wagon platform. The full wagon is hauled on to the platform and centered in position. The winch is then started and the platform immediately begins to move laterally forward on rollers until the side of the wagon rests against a longitudinal spring-loaded bolster built integrally with the hoisting arms. The side thrust of the wagon is thus taken off the wheel flanges.

The hoisting and turning over movements continue until the wagon has turned through 90° when the top of the wagon engages with a number of vertical arms which effectually clamp the wagon between themselves and the platform, and allow the wagon to be turned over safely to its final emptying position. As soon as the wagon is completely emptied, the operation of the winch is reversed and the platform with the empty wagon returns to its normal position. The wagon is then hauled away to make room for the next full wagon.

The complete cycle of operation of the tippler as described above occupies a period of 90 seconds. A further 90 seconds are required to change the wagons, thus giving the equipment a handling capacity of 20 wagons per hour during continuous working.

The tippler is operated by a 75 h.p. 230-volt, D.C. motor supplied with current from a 65 kw. motor-generator set. The control gear is of the contactor type and this, together with the protective relays, are housed in a sheet steel cubicle on the top of which is mounted a dynamic braking resistance. A diagram showing the circuit arrangements of the control gear is shown in fig. 7.

Coal Conveying System

The coal is emptied from the wagon into a large receiving hopper built in front of the wagon tippler whence it is drawn by three belt feeders at a uniform rate of 400 tons per hour, and fed to the first of a series of belt conveyors designated No. 3 in fig. 4, which leads to the storage ground or to the ship as required.

The No. 3 belt conveyor rises out of the tunnel under the feeder belts, and is provided at ground level with an automatic continuous belt weigher which automatically weighs and records all coal received from the tippler.

The coal is discharged over the head end of No. 3 conveyor on to either the main storage feeding belt conveyors Nos. 4 and 5, or to a short connecting belt conveyor No. 6, which leads to the second of the main trunk line conveyors No. 7 running through a tunnel under the storage ground. The No. 4 conveyor rises and delivers to No. 5 conveyor which runs over the storage ground, shown

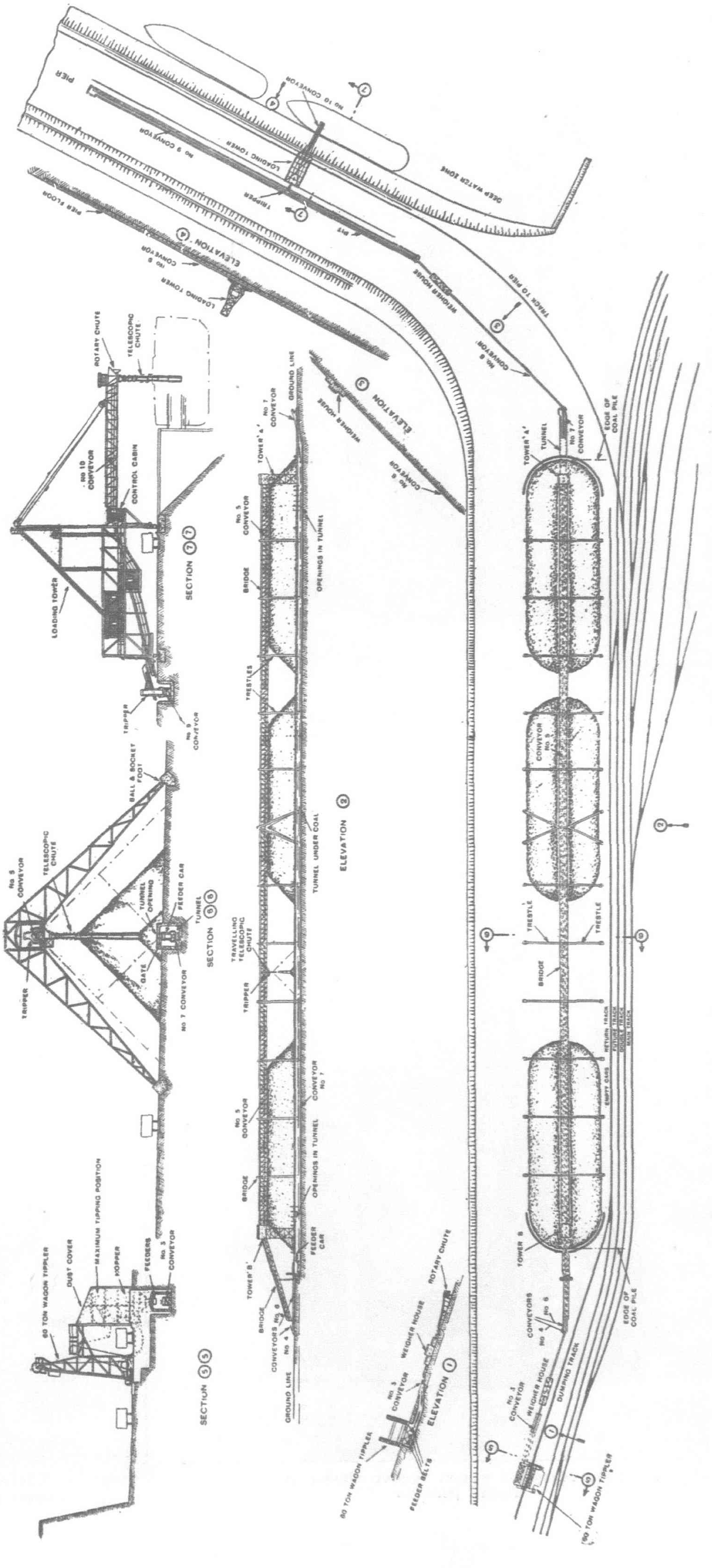


Fig. 4.—General arrangement of coal handling plant on the Lunghai Railway, at the port of Lian Yuen, China

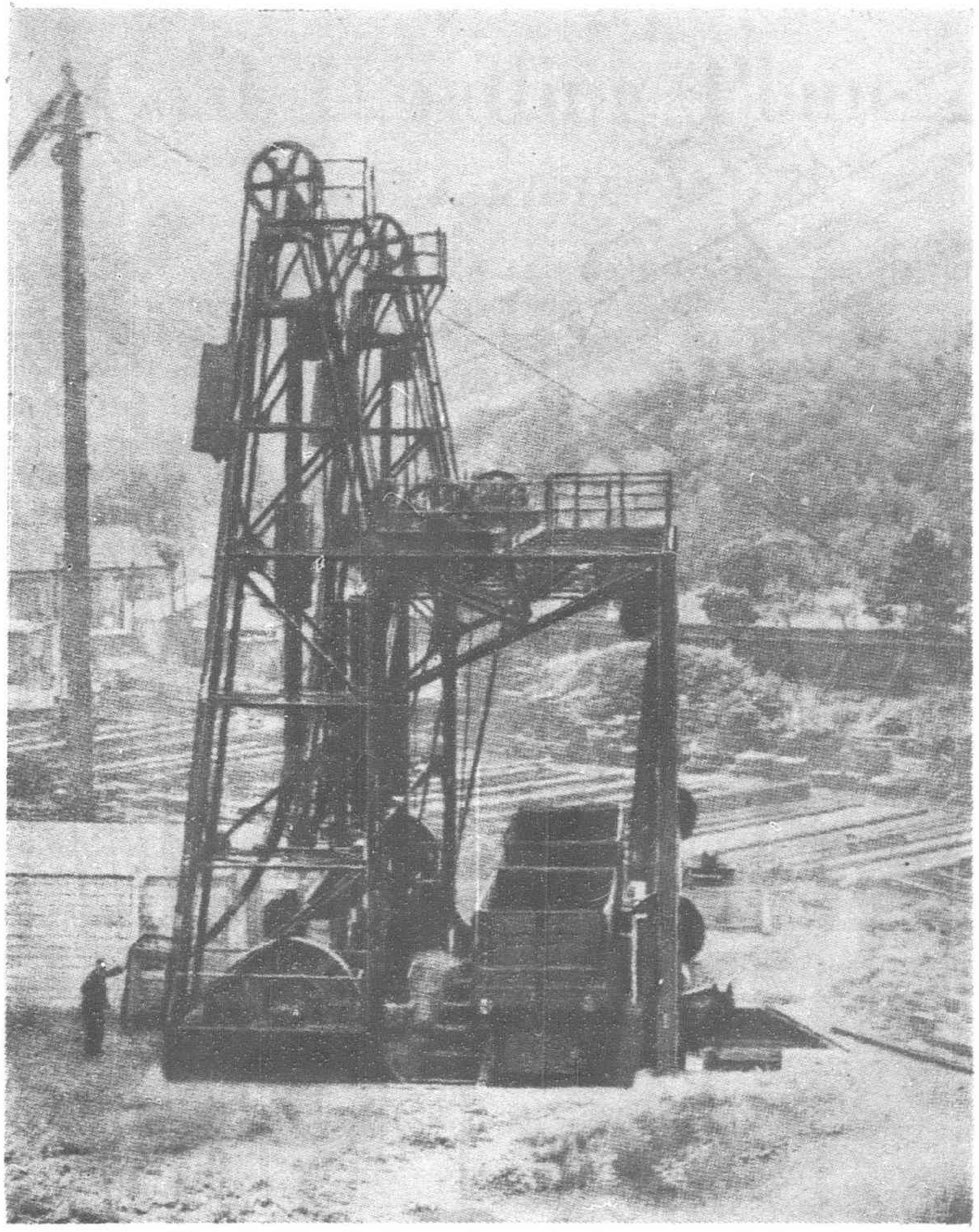


Fig. 5.—60-ton Marshall wagon tippler erected for tests at Fraser & Chalmers Engineering Works

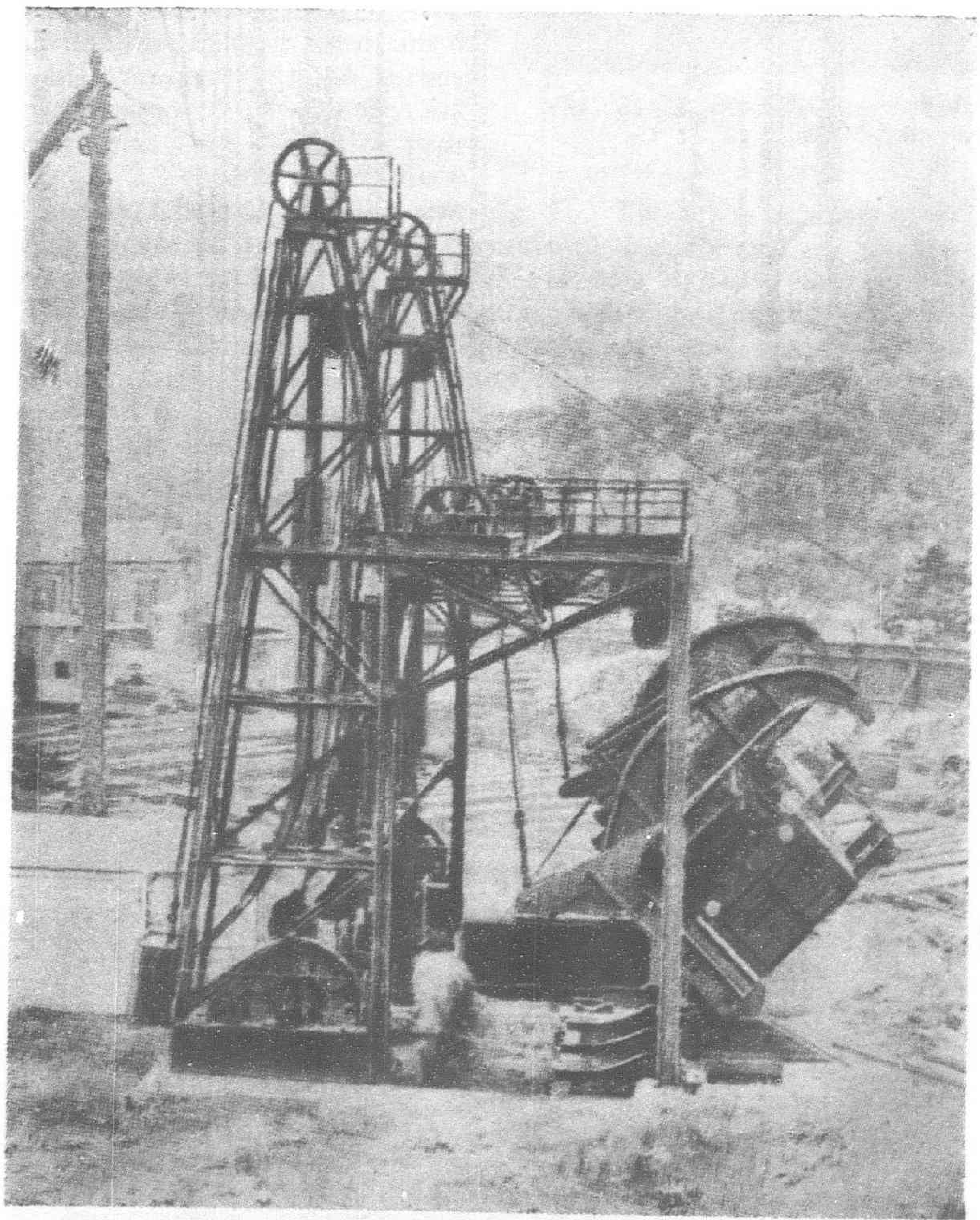
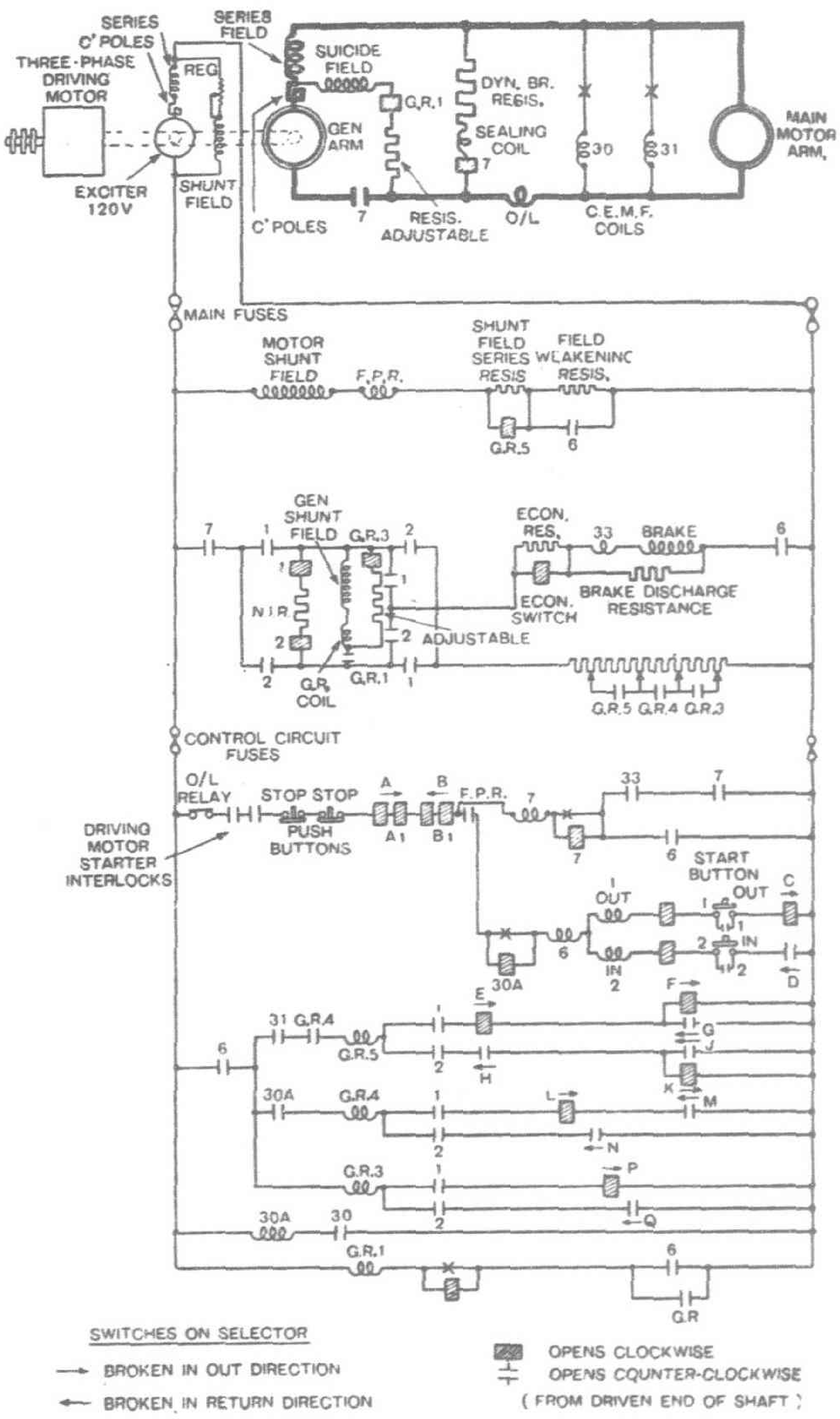


Fig. 6.—60-ton Marshall wagon tippler shown in its fully tipped position



X	OPERATING COIL SERIES RESISTANCES
7	MAIN LOOP CONTACTOR
1 2	GEN. FIELD REVERSING CONTACTORS MECHANICALLY INTERLOCKED
6	COMMON CONTACTOR
G.R.5 G.R.4 G.R.3	ACCELERATING CONTACTORS (GEN. FIELD CIRCUIT)
G.R.1	SUICIDE FIELD CONTACTOR
30 30A	ACCELERATING AND ANTI-PLUGGING RELAYS
31	ACCELERATING RELAY
F.P.R.	MOTOR FIELD PROTECTIVE RELAY
G.R.	GEN. FIELD RELAY
33	BRAKE INTERLOCKING RELAY
	A. B. C. D. E. F. G. H. J. K. L. M. N. P. & Q. SELECTOR SWITCHES

OPERATIONS AS BELOW

OUTWARD TO TRIP

1 START "0" FT. ACCELERATE TO 20 FT./MIN.
2.M CLOSES 2'-6" „ FROM 20 TO 54 FT./MIN
3.F OPENS 21 FT. RETARD FOR FULCRUM CHANGE
4.G CLOSES 22 FT POINT OF „ „
22'-6" ACCEL AFTER „ „
5.E OPENS 34'-6" G.R.5 OUT, 33 FT./MIN.
6.L OPENS 35'-6" G.R.4 „ 20 FT./MIN.
7.P OPENS 35'-9" G.R.3 „ 12 FT./MIN.
8.C OPENS 36'-0" STOP
9.A OPENS 36'-3" OVERTRAVEL SWITCH

RETURN

1 START "0" FT ACCELERATE TO 54 FT./MIN
13 FT. RETARD FOR FULCRUM CHANGE
2.J OPENS 14 FT. POINT OF „ „
3.K CLOSES 14'-6" ACCEL AFTER „ „
4.H OPENS 32'-3" G.R.5 OUT
5.N OPENS 33'-3" G.R.4 OUT
6.Q OPENS 35'-6" G.R.3 OUT
7.D OPENS 35'-11" STOP
8.B OPENS 36'-3" OVERTRAVEL SWITCH
A1 & B1 FINAL OVERTRAVEL LIMIT SWITCHES OPERATED BY MAIN BALANCE WEIGHT

Fig. 7.—Diagram showing the circuit arrangements of the control gear for the Marshall wagon tippler

in fig. 8, in which it will be seen that the storage conveyor is contained in a series of bridge spans carried on splayed trestle legs designed to clear the storage piles.

Coal is delivered on to the storage ground at any predetermined point by means of an automatic travelling tripper mounted on No. 5 conveyor. The tripper connects with a travelling telescopic chute which is connected to the bridge spans and travels along underneath them.

Coal is reclaimed from the storage ground through a number of gate openings arranged at intervals along the roof of the tunnel, and is fed to No. 7 tunnel conveyor by means of a travelling feeder car which runs along inside the tunnel. Means are provided on the feeder car for opening or closing the gates by power of any particular opening in the roof of the tunnel and coal is drawn through the gate for as long as required or until the pile over the

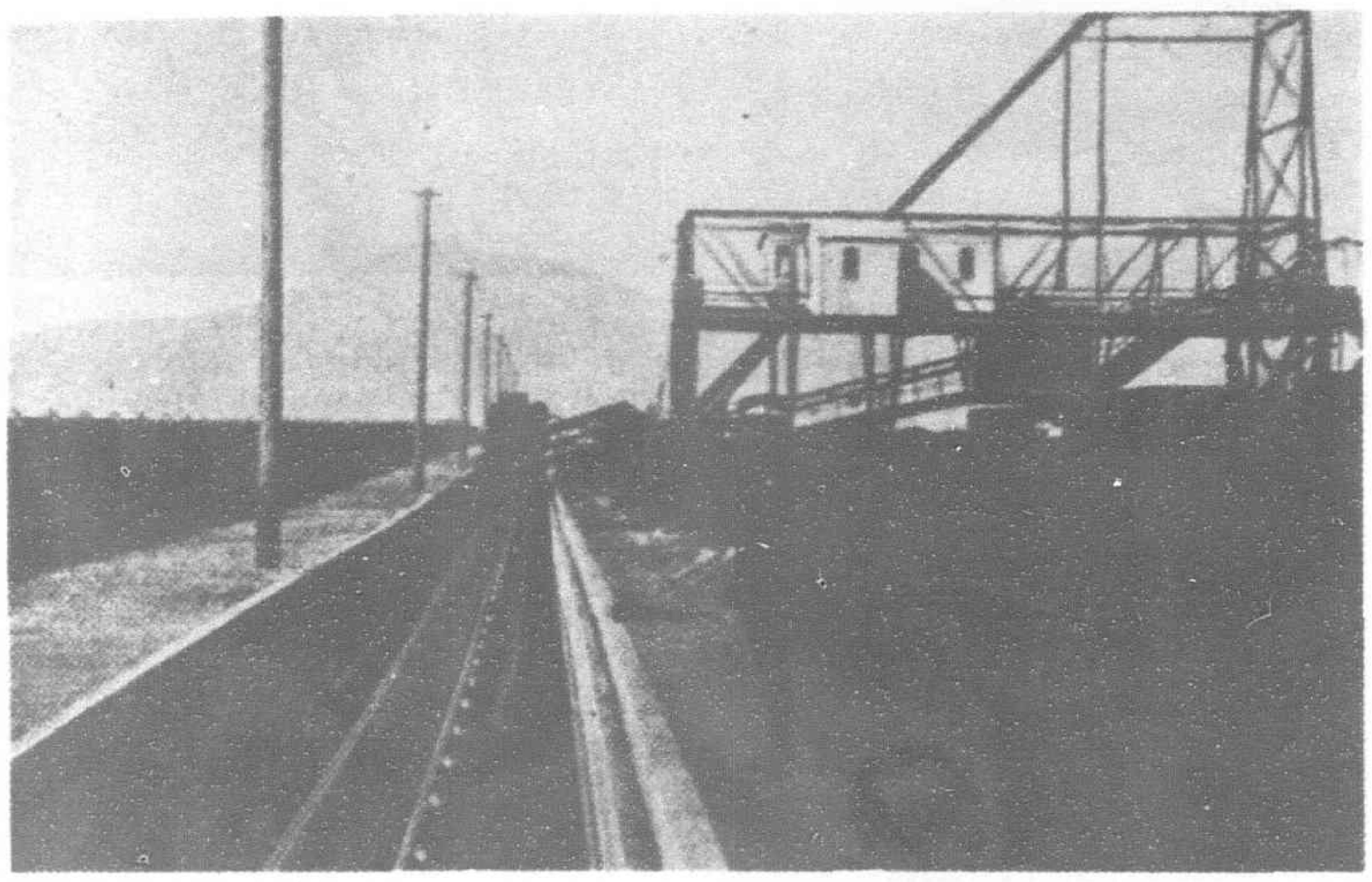


Fig. 10.—View of No. 9 coal conveyor running inside trench

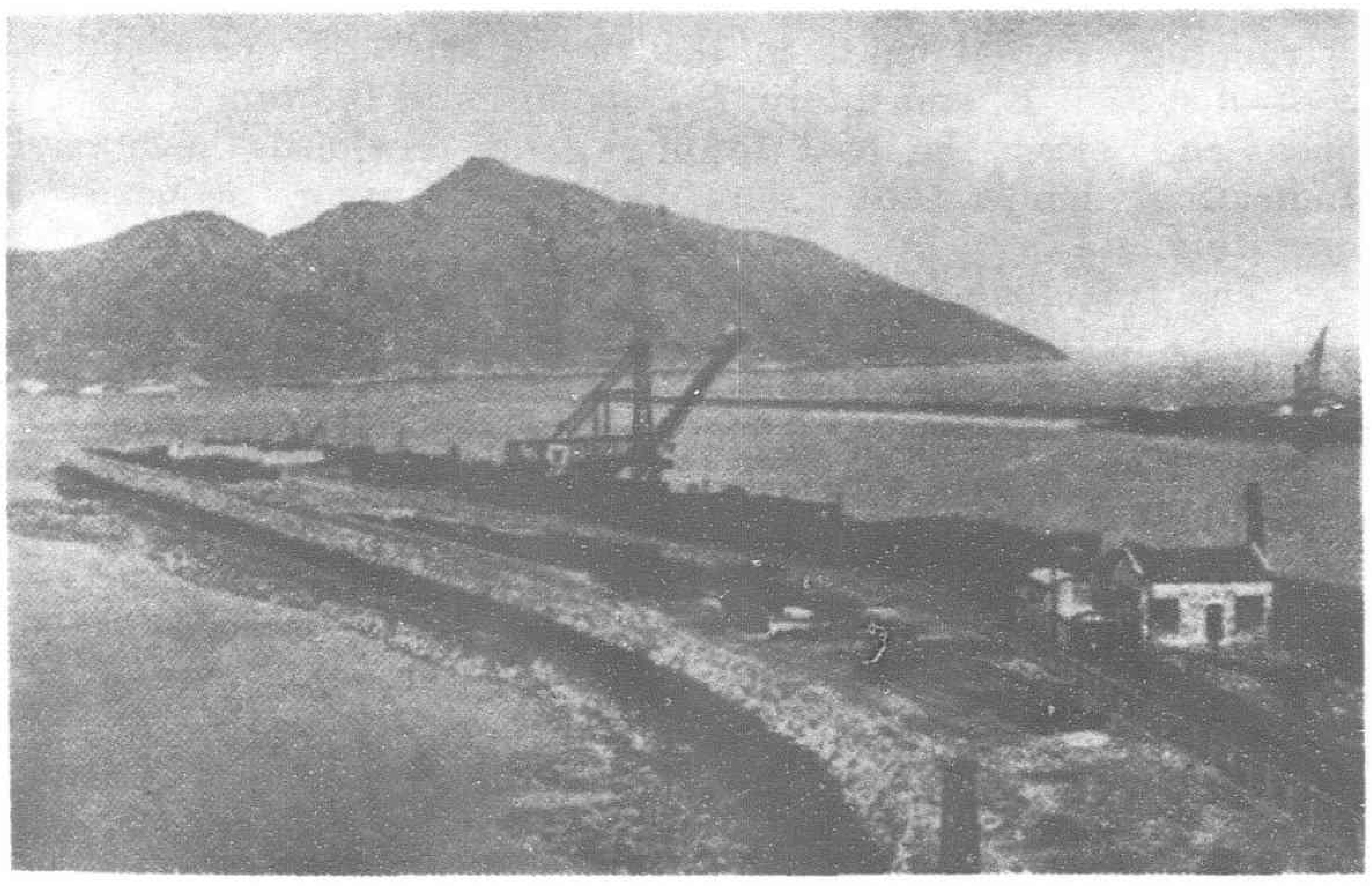


Fig. 11.—View of ship loading pier from the end tower of No. 5 conveyor

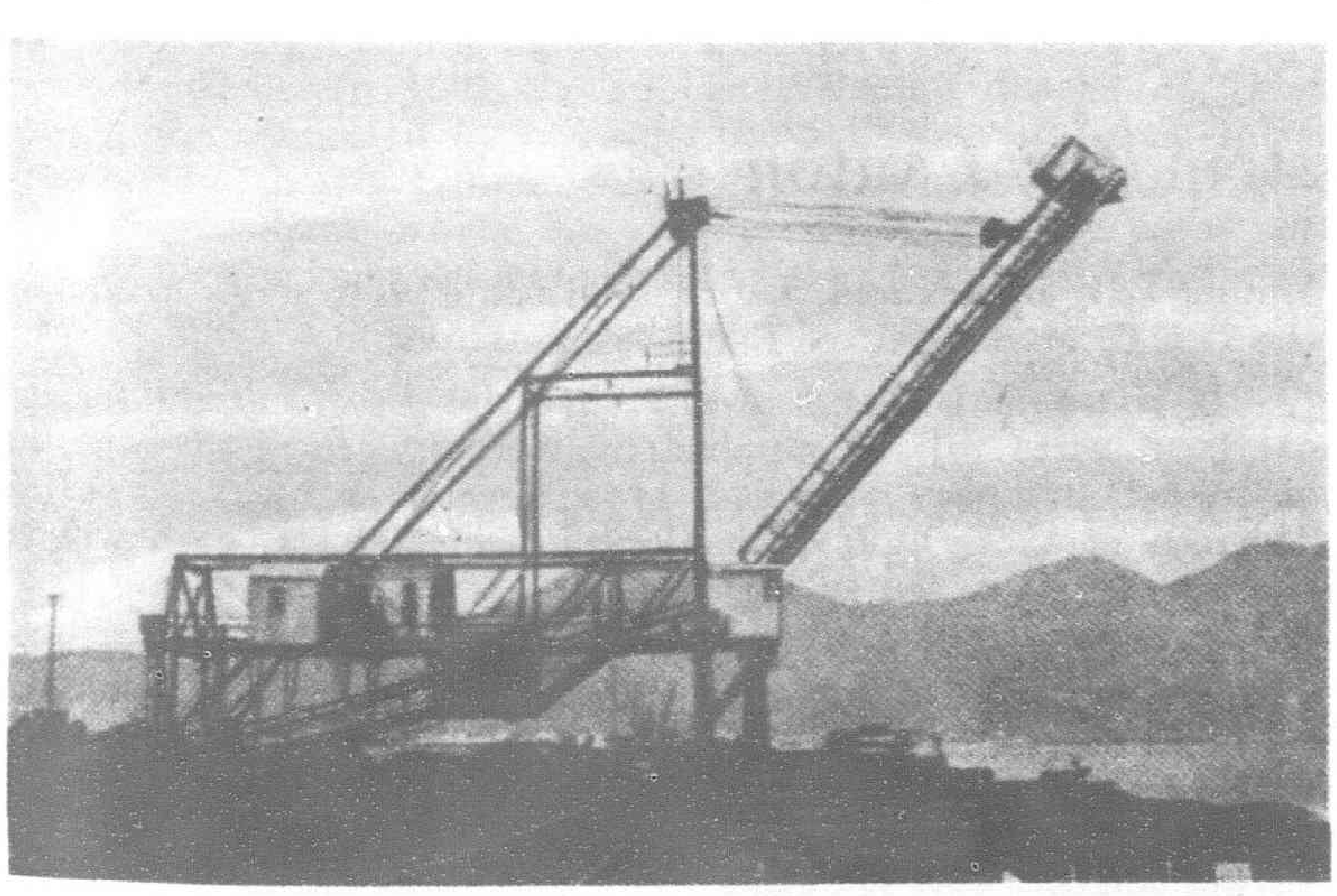


Fig. 12.—Travelling ship-loading tower which runs along the length of the ship wharf

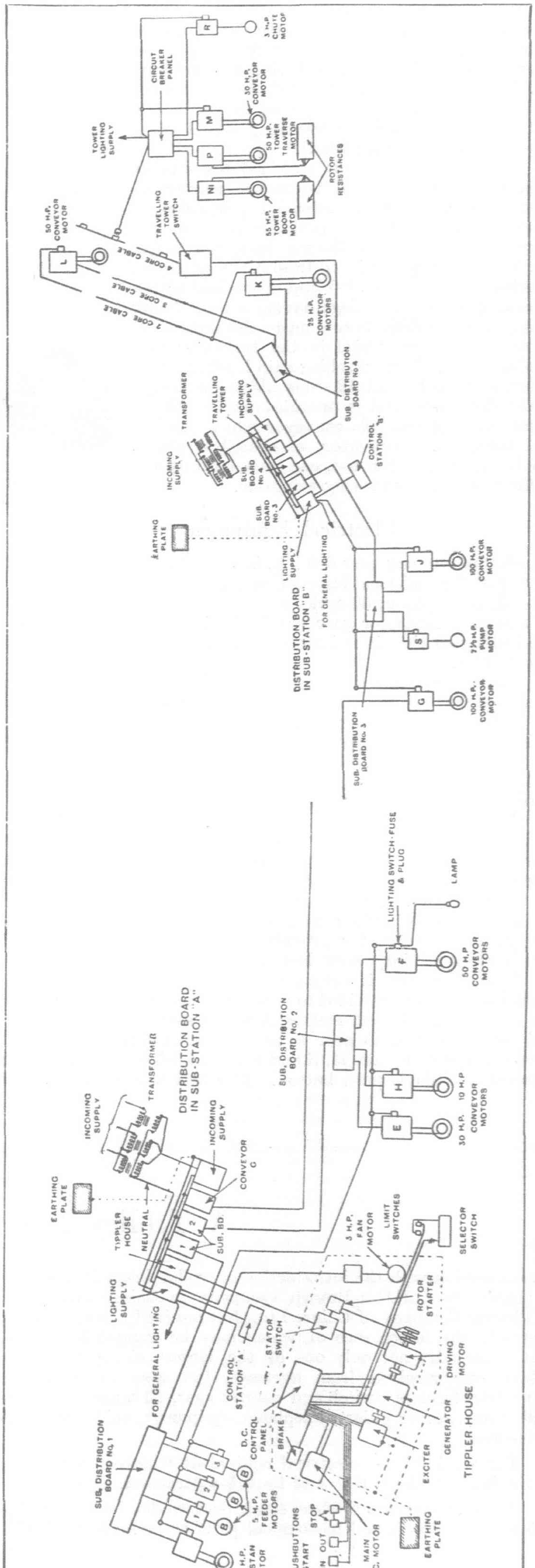


Fig. 9.—Diagram of connections showing control wiring between electrical equipment in the substation, tippler house and coal conveying plant

gate is exhausted. When required No. 7 tunnel conveyor will also receive coal direct from the wagon tippler via No. 3 and No. 4 conveyors. No. 7 tunnel conveyor is intended solely to deliver coal to the ships alongside the wharf via Nos. 8 and 9 conveyors and the travelling ship loading tower running along the wharf.

The No. 8 conveyor is provided towards its head end with a second automatic continuous belt weigher, which is intended primarily for recording the weight of coal drawn from the storage ground and delivered into the ships. No. 9 conveyor, which is fed from No. 8 conveyor, runs inside a trench (fig. 10), and is provided with a travelling throw-off carriage having a wing feeder conveyor which delivers coal on to the tail end of a boom conveyor carried in the travelling ship loading tower. The travelling ship loading tower, shown in figs. 11 and 12, runs along the length of the ship wharf and is provided with a hinged boom carrying the belt conveyor which receives coal from No. 9 conveyor, as described above. The boom, when not in use, can be hoisted up out of the way of ships moving alongside.

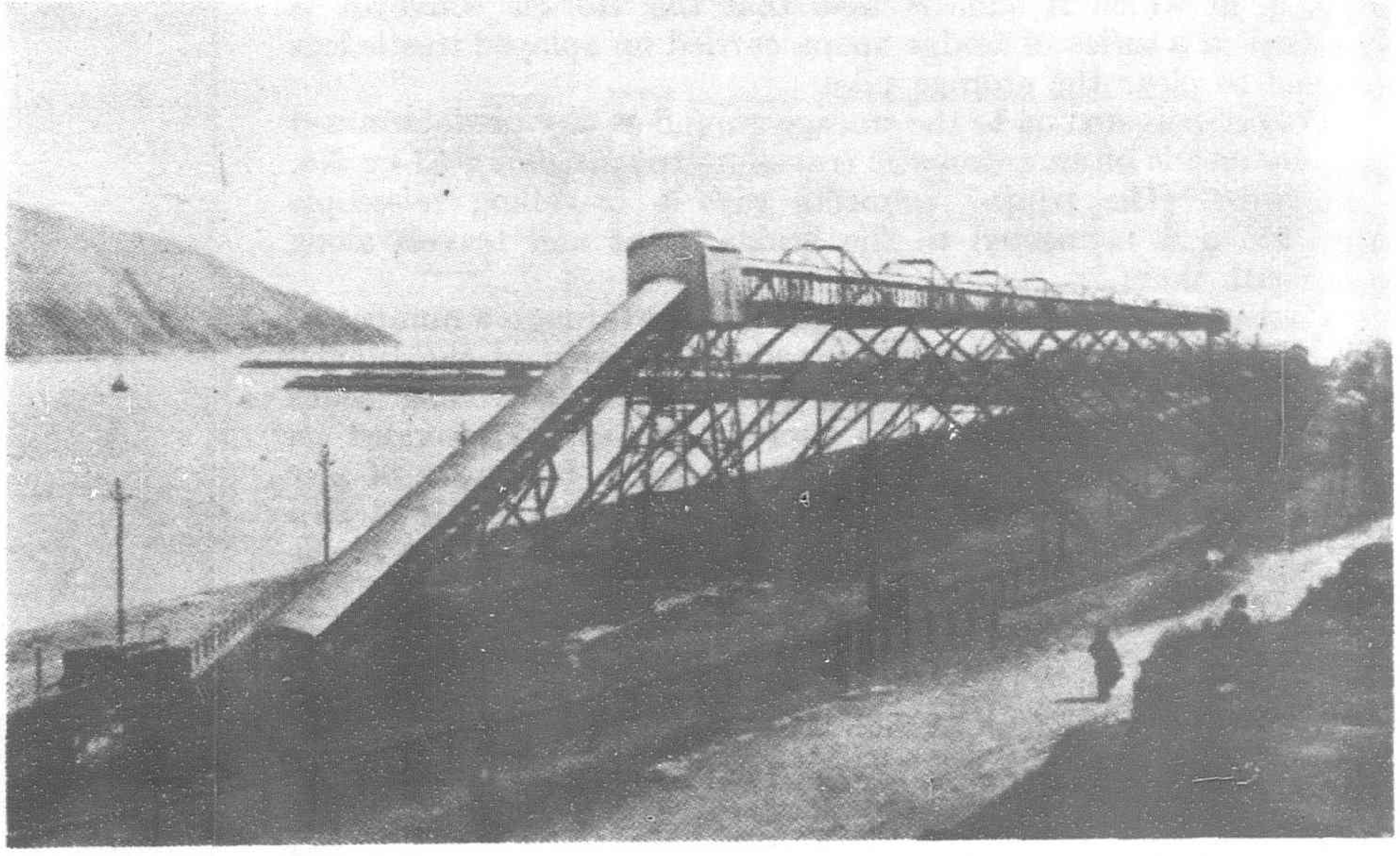


Fig. 8.—Storage ground and part of the coal handling plant. The travelling throw-off carriage operates along the belt conveyor on this bridge, delivering coal to the storage ground, which is 1,640 feet long and is capable of holding 160,000 tons of coal

Electrical Equipment

Motors totalling over 600 h.p. in capacity are employed in the driving of the coal handling equipment. The motors operate on a 350-volt three-phase, 50-cycle, supply, and are remote controlled by means of contactor gear provided with a system of sequence interlocking so that it is impossible to start up conveyors in the wrong order.

Power for the coal handling plant is taken from the power station to two substations, known as Substation A and Substation B. Both substations contain a 6-panel industrial type switchboard controlling incoming and outgoing power feeders and lighting equipment. Substation A feeds the tippler, sub-distribution boards 1 and 2, and conveyor G (see fig. 9), while substation B feeds sub-distribution boards 3 and 4, and the travelling tower.

The contactor gear controlling the conveyor motors is of the air-break type, and is housed in dust and weatherproof cases. The gear is arranged to operate in conjunction with remote control push buttons and the acceleration of the motors from starting is controlled by timing relays. Each starter is provided with an externally operated isolating switch and sequence interlocking contacts; also cutout switches for providing local control, together with switch plugs for inspection lamps.

Remote control is arranged as follows:—Two push button control stations are provided to give the correct sequence of starting the conveyors. Control station A is situated near substation A, and control station B near substation B. Control station A is arranged to start motors H, E and B in that order (see fig. 4) by the pressing of a single push button. This action will start the conveyors taking the coal from the tippler to the storage ground in the correct order. The pressing of a second push button starts motors G, F, E, B, in that order, if it is required to start the conveyors taking coal through the tunnel. It should be noted that a coal chute is provided between conveyors H and G which actuates a limit switch and so determines the sequence in which these two conveyors will be started.

Control station B starts the motors L, K and G, in that order from a single push button, but these motors will start only when motor M (mounted in, and controlled from, the loading tower) is running. Signal lights in the tunnel are also operated from control station B, and inform the operators in the tunnel when to open and close the coal feeding gates previously mentioned. Indicating lamps also show which conveyor sequence is operating.

The travelling ship loading tower is supplied with current through a flexible cable and 6-point plug which can be inserted into any one of twelve sockets situated along the quayside. This enables the tower to take up any convenient position. The supply from the socket is taken to a protective panel fitted with isolator, circuit breaker and overload relays. Thence the supply is fed to two drum controllers for the boom hoist and traverse motors, and also to a reversing contactor starter controlling the motor operating the telescopic chute which feeds coal into the hold of the ship.

In conclusion, it should be mentioned that the contract included all the lighting equipment required for the power station and coal handling plant and all the cabling and wiring.

A Trolley Bus System for Canton

In connection with the introduction of trolley buses in the city of Canton the G.E.C.'s Branch Company in China, The General Electric Company of China, Ltd., has received a comprehensive contract, the importance of which may be gauged by the fact that it includes not only one of the largest single trolley bus orders ever received from overseas, but also power rectifier plant, transformers, switch and control gear, 22 miles of overhead trolley line, feeder pillars, telephone equipment, cables and other accessories.

The whole of the electrical equipment will be manufactured in England by the G.E.C. and its sub-contractors.

A total of seventy 4-wheel single-deck trolley buses have been ordered, the chassis and mechanical parts to be made by Leyland Motors Ltd., of Leyland, Lancs., and the 80 h.p. series motors by the G.E.C. at its Witton Engineering Works.

It is particularly interesting that the direct current for the overhead wires will be supplied by mercury arc rectifiers of the air-cooled pumpless steelclad type developed by the G.E.C. Thirteen of these units giving outputs of 300 kw. each will be accommodated in ten substations.

This type of rectifier, which has been chosen in competition with other forms of converting plant, has the great advantages that no water pump or vacuum pump is required, no fragile material such as glass is employed, there is an almost total absence of back fires, and the rectifier is built complete with control gear in cubicle, saving space.

Malaya's Highly-Developed Railways

By J. SANDERS, Acting General Manager, F.M.S. Railways, in the Financial News of Malaya

There are probably few countries in the world where railway development has been so rapid and forms of transport offered so varied as in British Malaya. This country provides a winter resort for travellers with an equable tropical climate, excellent steamship services and very fine motoring roads. Up-to-date hotel accommodation is available in the principal towns, which offer attractions of varying interest to visitors.

The Federated Malay States Railways serve the whole Peninsula. The length of the line, geographically, is 1,068 miles, and is the property of the Federated Malay States Government, with the exception of 121 miles in Johore, which is leased from that State. The line passes, in turn, through magnificent jungle scenery, picturesque padi fields, tin mining areas comprising dredge and open-cast methods, and rubber plantations.

The first line in Malaya, built by the State Government of Perak, was opened on June 1, 1885, and extended for eight miles from Taiping to Port Weld. The following year railway communication was established by the Selangor Government between Kuala Lumpur and Klang (then named Bukit Kudah), a distance of 21½ miles. In 1901 a general manager and a chief engineer were appointed to control the railways in the States of Perak and Selangor. At the end of 1903 the two State systems were connected and railway communication established between Penang and Negri Sembilan via Kuala Lumpur, the mileage opened to traffic being 340. There is a ferry service between Penang and Prai (mainland). The system was continued southwards, and under an agreement with the State of Johore the line was extended to Johore Bahru, opposite Singapore Island. In 1909, through communication was thus established from Penang to the most southern extremity of the Peninsula. A wagon ferry service across the Straits of Johore was introduced on January 1, 1910, linking up with the Singapore line, which had been opened in 1903.

The main line was extended northwards from Bukit Mertajam to Alor Star (Kedah) in 1915, and three years later through Perlis to the Siamese frontier at Padang Besar, connecting with the Royal State Railways of Siam. A causeway, 3,465 feet in length, carrying the railway and a 26 foot roadway connecting the island of Singapore with the Peninsula, was opened for traffic in 1923. The causeway is constructed entirely of granite blocks, over one and a-half million cubic yards being used. A lock, 510-ft. long, 32-ft. wide and 10-ft. deep at low tide, has been constructed through the causeway at the Johore end for small local craft. A rolling lift-bridge, the only one of its type in this part of the world, carries the railway and roadway across the lock. The bridge is 57-ft. wide and the weight of the moving part is 570 tons.

Branch Line System

Branch lines serving industrial districts have been opened from time to time. In 1893 the rubber-producing district of Teluk Anson was connected by rail with the main line at Tapah Road. The original Kuala Lumpur-Klang line was extended in 1899 to Port Swettenham, which has developed considerably as a port for ocean-going steamers and is used by the principal eastern freight lines as well as local and European passenger steamers. In the State of Selangor, the road metal quarries at Batu Caves were connected by railway with Kuala Lumpur in 1905, and the most important tin-mining area of the Kinta Valley in the State of Perak was provided with a line from Ipoh to Tronoh in 1908. In 1914 a connection was made between the tin mines at Ampang, near Kuala Lumpur (the Federal capital), and in the next year the Malayan Collieries at Batu Arang were linked up with the main line at Kuang. Branch lines connect Malacca town, and Port Dickson in Negri Sembilan, with the main line.

The East Coast Line proceeds northwards from Gemas through Negri Sembilan, Pahang and Kelantan, terminating at the port of Tumpat on the China Sea. The length of this line is 328 miles. A branch line from Pasir Mas on the East Coast Line connects with the Royal State Railways of Siam at Sungei Golok, thus providing an alternative route to Siam from Singapore. A ferry service is also maintained between Palekbang and Kota Bharu (capital of Kelantan).

Between Penang and Singapore, the two largest ports of Malaya, a daily service of fast through trains is maintained. Restaurant cars, on which an excellent breakfast, luncheon or dinner is served at a very reasonable price, are provided, and the night trains have, in addition, comfortable and spacious sleeping saloons—two-berth cabins, bedding, linen, etc., being supplied. A commodious buffet parlor car is attached to the night express trains between Singapore-Kuala Lumpur-Penang. Two air-conditioned coaches were introduced on the Kuala Lumpur-Penang day express trains in March, 1937.

Facilities for Travellers

A traveller whose steamship calls at both Penang and Singapore has time to visit Penang (if proceeding eastwards), make a tour of that delightful island, travel by night express train to Kuala Lumpur, spend the day there, and proceed by night express train the same evening to Singapore, arriving there next morning in time to make a tour of the island before rejoining the vessel. A similar journey can be made in the opposite direction, i.e., disembarking at Singapore and rejoining at Penang.

Through express trains run from Penang to Bangkok on Mondays and Fridays, and in the reverse direction on Saturdays and Wednesdays. These trains are equipped with up-to-date day and night coaches, restaurant cars, etc. Bangkok is within twenty-six hours' train journey of Penang and within fifty-two hours of Singapore.

Breakfast, tiffin and tea baskets are obtainable at the principal stations or can be ordered by passengers *en route* through the guard of the train or any station master, who will telegraph free of charge.

At Ipoh and Kuala Lumpur large and up-to-date railway hotels adjoin the station. At Singapore there are rest rooms, also a restaurant and bar on the station premises for the convenience of passengers.

The total number of stations on the Federated Malay States Railways is 213, and from 120 of these stations lorry services operate for the collection and delivery of goods and parcels. In addition to maintaining road transport services at all the principal stations throughout the system for the purpose of providing door-to-door transport, the railway also arranges through booking of passengers between any station on the system and many rural areas, including the two principal hill stations of Malaya, viz., Fraser's Hill and Cameron Highlands. The road journeys between Kuala Kubu Road Station and Fraser's Hill, a distance of 26 miles, and between Tapah Road and Cameron Highlands, a distance of 47 miles, are made by well-equipped motor-cars.

The railway is of meter gauge corresponding with the Siamese railways and is mostly single track. To those who are only acquainted with the standard gauge railways, a meter track suggests transport difficulties in the restriction of size of vehicles, locomotives, speed and general possibilities. The Federated Malay States Railways provide a very high degree of transport service equal in every respect to that provided by standard gauge systems in more developed countries. The system is operated with the latest types of locomotives and equipment generally. This comprises 163 locomotives, six rail motor coaches, 378 passenger cars, 4,666 goods vehicles, 340 motor-car trucks, horse boxes and cattle wagons, 11 steam vessels and 79 lighters.

Freight cars include a variety of types. The standard covered vehicle is of 12 tons capacity, while others of special construction to carry unusual loads have a capacity of 36 tons.

The standard locomotive is a 4-6-2 Pacific type, weighing 109 tons in service. The permanent way is of 80 lb. B.S.S. rails laid on timber sleepers and metal ballast. The maximum axle load is 16 tons.

Port Swettenham

Port Swettenham, which is railway-owned and operated, is situated at the mouth of the Klang River. The harbor is completely land-locked, and there is a minimum depth of 25-ft. over the bar at the southern entrance (the average rise of tide being 15-ft. at springs and 9-ft. at neaps) and of 32-ft. in the average.

There is one wharf 1,008-ft. long with 31-ft. minimum depth of water, two T-headed wharves each 100-ft. long with 15-ft. water, and a pontoon wharf 200-ft. long with 12-ft. minimum depth of water.

The wharves are equipped with four 3-ton and one 5-ton steam cranes, and with four 2-ton and one 5-ton electric cranes. A travelling 20-ton steam crane is available for lifts over five tons. Lifts up to 35 tons can be dealt with by special arrangement.

Vessels up to 11,000 tons are regularly berthed at the main wharf for the discharge and loading of cargo. There are 77 lighters, with an average carrying capacity of 75 tons, for transporting cargo to and from ships berthed in the harbor. Tugs are provided. Railway lines serve the main wharf, and cargo can be handled direct between ships and wagons. Ample storage accommodation is available in railway warehouses.

FEDERATED MALAY STATES RAILWAYS—FINANCIAL RESULTS, 1934-1936

	1934	*1935*	*1936*
(1) Gauge	Meter	Meter	Meter
(2) Route mileage :			
(*a*) Owned	947	947	947
(*b*) Leased from Johore Government	121	121	121
Total ..	1,068	1,068	1,068
(3) Capital Account—Receipts :			
(*a*) From Loans	$49,735,103	49,834,323	50,036,123
(*b*) From General Revenue ..	185,553,104	185,415,203	177,343,031
Total ..	$235,288,207	235,249,526	227,379,154
(4) Capital Account—Expenditure :			
(*a*) Railways	$200,957,649	200,931,583	195,416,145
(*b*) Docks, Harbors and Wharves	23,687,359	23,673,114	22,068,609
(*c*) Ferry Services	931,040	931,040	396,149
(*d*) Other property	9,712,159	9,713,789	9,498,251
Total ..	$235,288,207	235,249,526	227,379,154
(5) *Railways*—Revenue from :			
(*a*) Passengers	$3,402,104	3,785,007	3,767,893
(*b*) Parcels, etc.	556,573	646,379	655,947
(*c*) Goods	5,005,860	5,098,124	6,373,997
(*d*) Live Stock	250,249	171,661	96,433
(*e*) Miscellaneous	222,441	204,603	227,335
Total ..	$9,437,227	9,905,774	11,121,605
(6) *Railways*—Expenditure (excluding renewals).			
(*a*) Maintenance of Way and Works	$1,632,277	1,758,595	1,820,061
(*b*) Maintenance of Rolling Stock	1,461,117	1,646,959	1,671,866
(*c*) Transportation Expenses ..	3,784,227	3,912,109	4,055,029
(*d*) General Charges	1,830,191	1,692,597	1,565,716
Total ..	$8,707,812	9,010,260	9,112,672
(7) Surplus on Railway Working ..	$729,415	895,514	2,008,933
(8) *Docks, Harbors and Wharves.*			
(*a*) Revenue	$820,812	795,309	897,950
(*b*) Expenditure (excluding renewals)	453,196	445,424	481,986
Surplus ..	$367,616	349,885	415,964
(9) *Ferry Services.*			
(*a*) Revenue	$163,435	189,077	257,601
(*b*) Expenditure (excluding renewals)	158,830	161,963	186,607
Surplus ..	$4,605	27,114	70,994
(10) *Road Motor Services.*			
(*a*) Revenue	$144,219	160,148	190,077
(*b*) Expenditure	144,700	163,436	193,542
These are hired vehicles which serve as feeders to the Railway .. Deficit ..	$481	3,288	3,465
(11) *Rentable Property.*			
(*a*) Rents	$565,268	611,518	619,500
(*b*) Upkeep and other Expenses (excluding Renewals) ..	244,852	316,257	337,569
Surplus ..	$320,416	295,261	281,931
(12) General Interest	$153,186	209,271	*
(13) Total Revenue (all services) ..	$11,284,147	11,871,097	13,086,733
(14) Total Expenditure, excluding renewals (all services)	9,709,390	10,097,340	10,312,376
(15) Total Surplus (all services) ..	1,574,757	1,773,757	2,774,357
(16) Appropriation of Surplus.			
(*a*) To Renewals Fund	1,574,757	1,773,757	2,687,657
(*b*) To Johore Government as rent of Johore State Railway ..	—	—	86,700
Total ..	$1,574,757	1,773,757	2,774,357
(17) *Renewals Fund.*			
(*a*) Income	$1,574,757	1,773,757	3,933,513
(*b*) Expenditure	435,883	737,683	771,179
(*c*) Balance in the Fund	7,478,163	8,514,237	11,676,571

FEDERATED MALAY STATES RAILWAYS—STATISTICAL RESULTS 1934-1936

(18) Number of passengers carried .. .. Number	5,498,159	6,137,540	6,877,055
(19) Passenger train miles .. Miles ..	2,459,562	2,662,169	2,816,553
(20) Revenue per passenger train mile	$1.61	1.66	1.57
(21) Average receipt per passenger .. .. Cents ..	62	62	55
(22) Tonnage of goods hauled Tons ..	1,404,658	1,513,154	1,903,239
(23) Goods train miles .. Miles ..	1,213,826	1,254,120	1,327,629
(24) Revenue per goods train mile ..	$4.33	4.20	4.87
(25) Average receipt per ton ..	3.74	3.48	3.40

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*In 1936 interest from Investments has been credited direct to Renewals Fund.

Large-scale Production Planned for new Duralumin Alloy

A new super-duralumin alloy with an ultimate strength of 45 kilos per unit, five kilos stronger than the conventional stock imported from abroad for use in Japanese aircraft and automobile industries has been perfected for large-scale industrial production through the extensive efforts of Dr. Hideo Nishimura of the Kyoto Imperial University and his colleagues at the Y.200,000 industrial research laboratory recently established by the Kobe Steel Works.

The duralumin, unlike its predecessors which were manufactured through the uses of chemicals, is manufactured according to the "Y" methods perfected by Dr. Nishimura himself, which calls for the manufacture of duralumin under atmospheric conditions; cooling in atmospheric temperatures and so forth.

The Kobe Steel Works, which will take over the manufacturing rights of the new duralumin, is understood to be rushing preparations for the large-scale production of the metal with a capital of over Y.90,000,000 and will commence production of high-grade aircraft and automobile parts, pistons in particular.

The progress of the industrialization of the new duralumin alloy is being watched with closest interest from all spheres concerned, though it is the general expectation that actual industrialization of the process of its manufacture will not take definite form till some time after July of the current year.

Development of Manchuria's Railways[*]

The railway lines in Manchuria measuring over 9,300 kilometers, are composed of those belonging to the South Manchuria Railway Company and those to the Manchoukuo Government. Since the management of the entire State Railways is entrusted to the S.M.R. Company, it may be said that all railway traffic in the country is entirely handled by the S.M.R. A treatment on the S.M.R. lines having been given in previous issues, it is the aim of the writer, in relating the development and administration of railway lines in Manchuria, to pay chief attention to the Manchoukuo State Railways.

The Mukden war-lords were no exception to the general practice of war-lords in China who look upon the railways as their own private property. They compelled the railway administrations to pay from their revenues military and political expenditures. Sometimes it even happened that the employees had to go unpaid for months, and wages were reduced by half. The taking of bribes in purchasing railway supplies was a commonplace. As for the management, the lines were operated independently of each other, at times occasioning competition among themselves. In other words, conception of rational and economical management of the railways was totally lacking.

The natural consequences of this state of affairs were the difficulties in the way of continuing operation. The railway revenues, which had shown a rising trend up to 1926, commenced to drop, and during the years from 1927 to 1929, when anti-Japanese activities were at their height, turned for the worse. In the hectic period of cut-throat competition against the South Manchuria Railway Company, after 1930, difficulties reached a crisis.

The following data from the representative lines, branching off to the east and west of the Nipponese-owned South Manchuria Railway lines, describe in part the conditions on the railways :

	Ssupingkai-Taonan Railway			*Kirin-Changchun(Hsinking)Railway*		
Year	*Revenue*	*Expenditures*	*Balance*	*Revenue*	*Expenditures*	*Balance*
		(*in M.Y.1000,*)			(*in M.Y.1,000*)	
1925	5,380	4,934	446	2,723	2,361	362
1926	9,171	8,196	975	3,039	2,845	194
1927	6.795	7,650	—855	3,332	3,110	222
1928	6,290	6,975	—685	3,656	3,191	465
1929	6,930	7,758	—828	3,915	3,431	484
1930	7,477	12,001	—4,524	3,066	3,645	—579
1931	8,235	13,400	—5,165	2,913	3,351	—438

NOTE :—Ssupingkai-Taonan Railway—The sudden drop in figures from 1930 is influenced in part by the drop in silver exchange rate.

Kirin-Changchun (Hsinking) Railway—The figures for 1931 show figures up to the end of October, the line being amalgamated with the Kirin-Tunhua Railway in November.

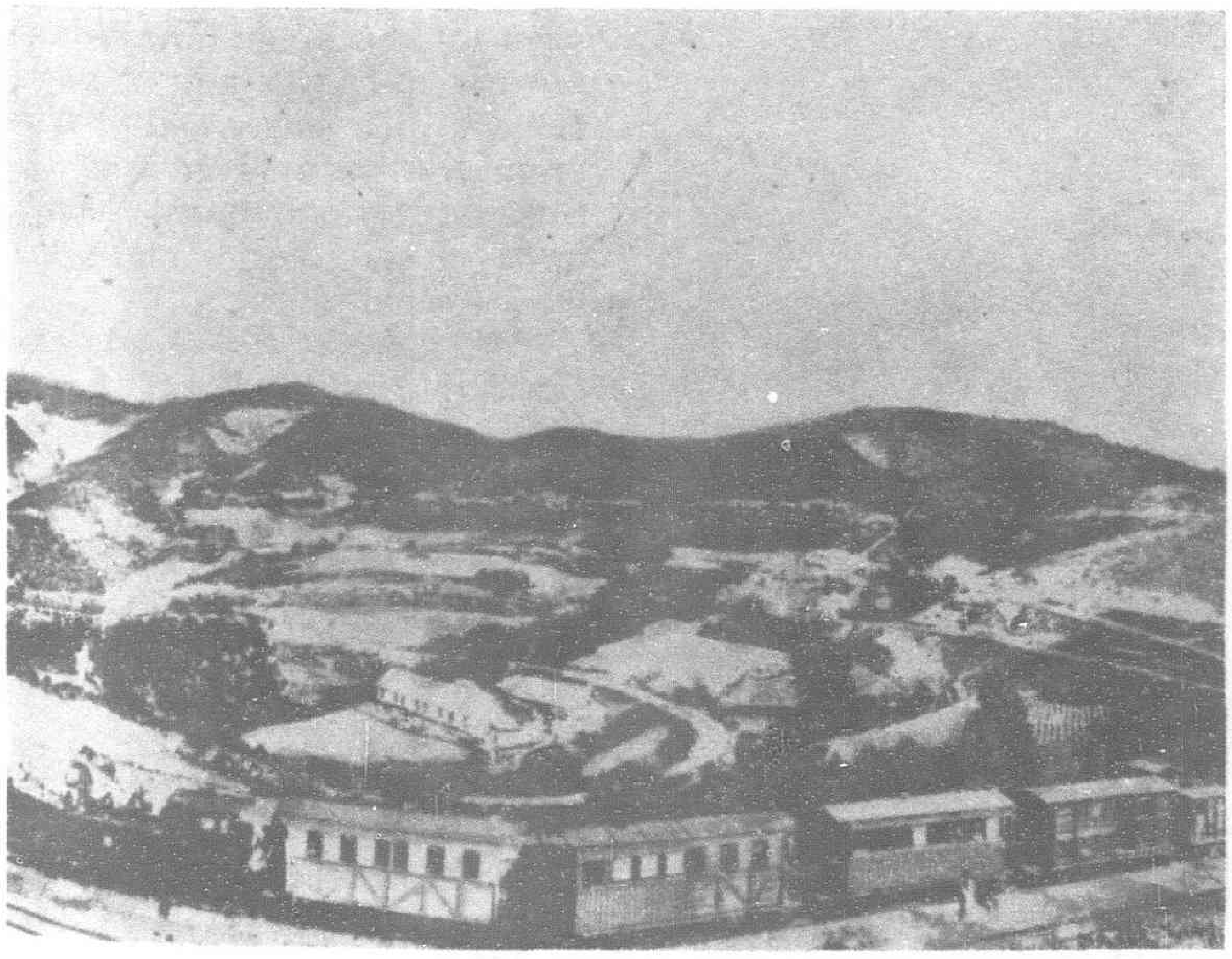
Moreover, the repairing and replenishing of rolling-stock and the maintenance of tracks were pitifully neglected. No thought was given to the disintegration of the railways, nor did the war-lords care to look back to basic factor such as the necessity of reorganizing their system of management and training and educating their employees. Ultimately this caused the men to forget their loyalty to the railways, and then the interests of the public and shippers were neglected.[†]

After the Manchurian Incident

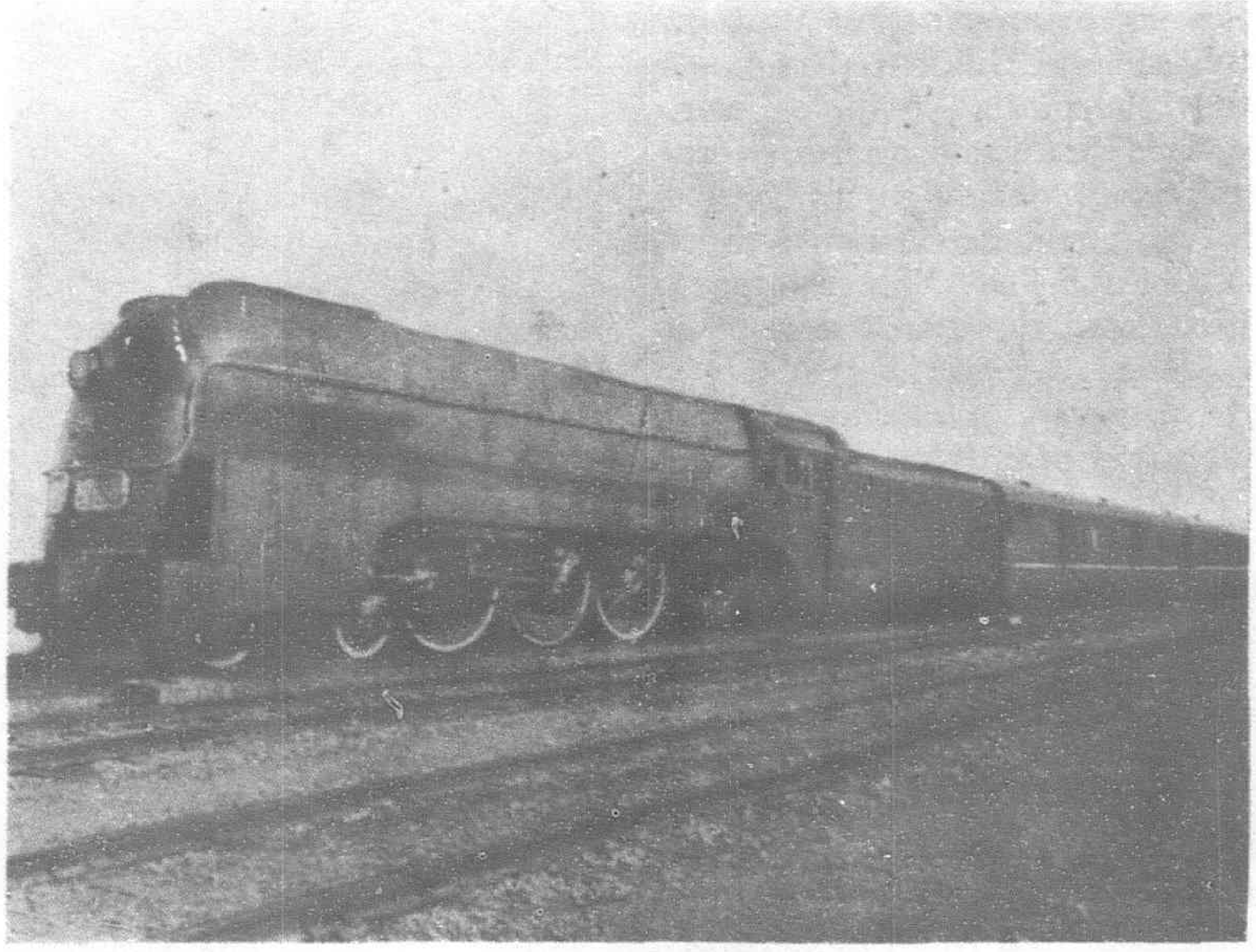
With the collapse of the Chang regime, the Northeastern Communications Committee, which was in charge of the railway administration, was also automatically dissolved. Thereafter, the administrative control of the railways underwent a series of changes from the old to the new communications committee and the Department of Communications of the new Government.

The Government of Manchoukuo, under a contract signed on February 8, 1933, entrusted the entire management of the Manchoukuo State Railways to the South Manchuria Railway Company. This was done principally for two reasons. In the first place, it was imperative to unify the widely variegated lines, most of them entailing large losses owing to their diversity and poor management, and it was most appropriate to assign the task to the Company which possessed both a long and tried experience and had shown unquestionable ability to manage and operate railways. In the second place, such an arrangement would be mutually advantageous in settling an enormous amount of Manchoukuo's indebtedness to the Company, estimated at 130,000,000 yen, which was incurred by the former Manchurian regime and which Manchoukuo had assumed, in connection with the financing and construction of several railways by the Company. In other words, the said loans were to be secured on the property and proceeds of the entire Manchoukuo State Railways. The arrangement also included the management of water transportation enterprises on the Sungari River, harbor undertakings at Yingkow and Hulutao, and bus line operations. In order to assume this tremendous responsibility, the S.M.R. immediately organized the General Directorate of Manchoukuo State Railways, with its headquarters at Mukden, which began its operations on March 1, 1933. Finally, the Manchoukuo Government entered into a contract with the South Manchuria Railway Company, commissioning the latter to take charge of the operation and management of the State railways of Manchoukuo, and the Communications Department of the Manchoukuo Government published a statement on March 1, 1933, giving the substance of the contract as follows :

The Government of Manchoukuo has decided to fix the total amount of obligations relative to the railways already opened to traffic due to the South



Trains that ran the tracks in 1907



The last word in Manchuria's railroad transportation, the Asia

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[*] From *Contemporary Manchuria.*

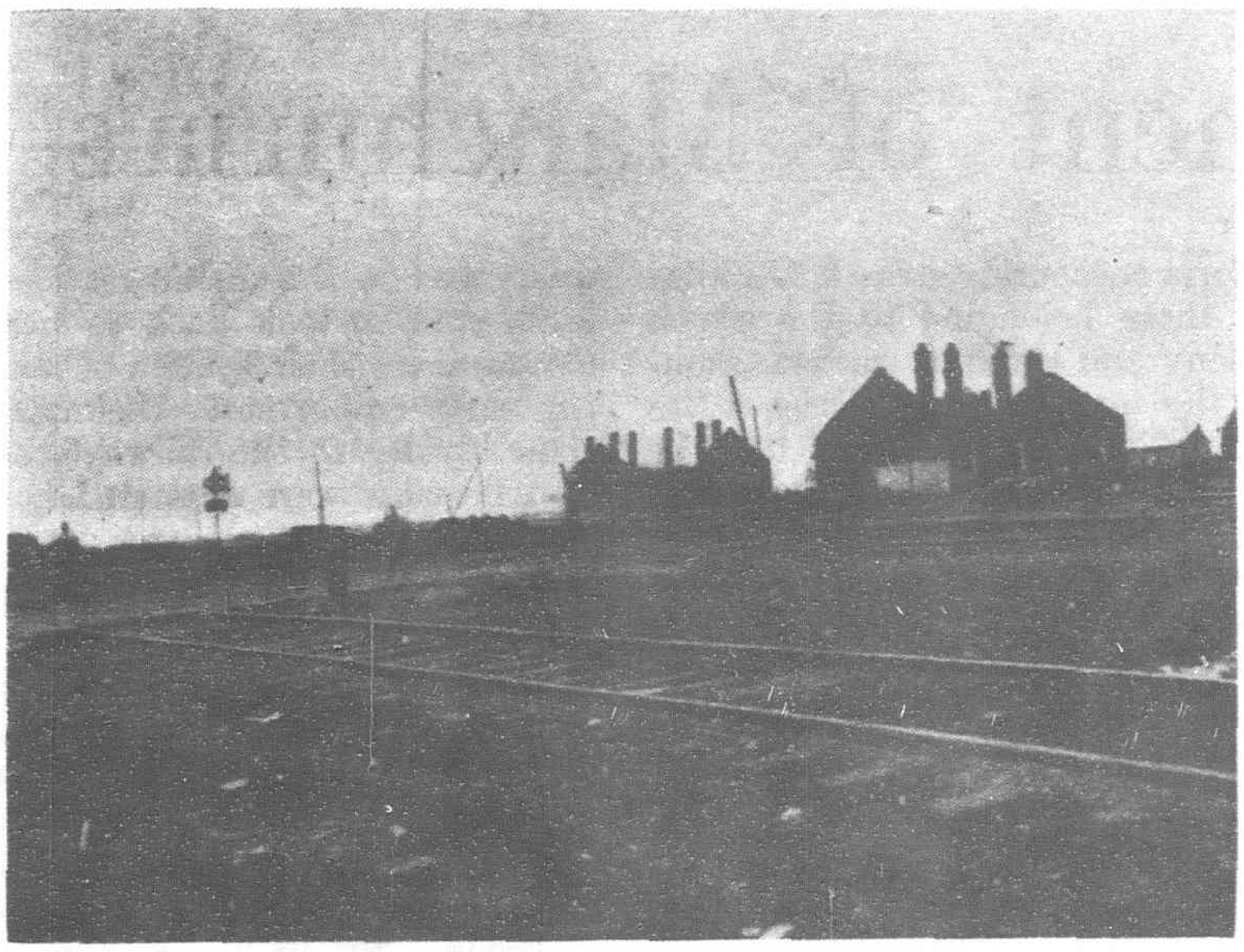
[†] *A Brief Survey of the Manchoukuo State Railways*, 1934, pp. 1-6.

Manchuria Railway Company, at G.Y.130,000,000, the railways involved being the Kirin-Changchun, Kirin-Tunhua, Kirin-Hailung, Ssupingkai-Taonan, Taonan-Anganchi, Taonan - Solun, Tsitsihar - Koshan, Hulan-Hailun (including a portion of the water transport enterprise on the Sungari River), Mukden-Hailung, and Mukden - Shanhaikwan lines (including the Tahushan-Tungliao line and its subsidiary harbors). *The total of the said loan is to be* secured on the entire property and receipts of the aforementioned railways whose management is to be entrusted to the South Manchuria Railway Company.

In respect to the claims and obligations relative to railways *existing between the* Manchoukuo Government and any third party other than the South Manchuria Railway Company, they shall be settled by the South Manchuria Railway Company upon consultation with the Government. In case payment is required in connection with this matter, it shall be effected from the receipts of the aforementioned commissioned railways. The funds necessary for the redemption of the loan of the British and Chinese Corporation secured on the Mukden-Shanhaikwan line shall also be derived from the same source. That portion of the Mukden-Shanhaikwan line relating to the British and Chinese Corporation loan shall be excluded from the mortgage for the present railway contract pending the settlement of the said Corporation loan.

In addition, the Government of Manchoukuo has granted to the South Manchuria Railway Company the contract for the building of the Tunhua-Tumenkiang Railway, the Lafa-Harbin Railway, and the Taitung-Hailun Railway lines. The total cost for the construction of these lines is estimated at G.Y.100,000,000.

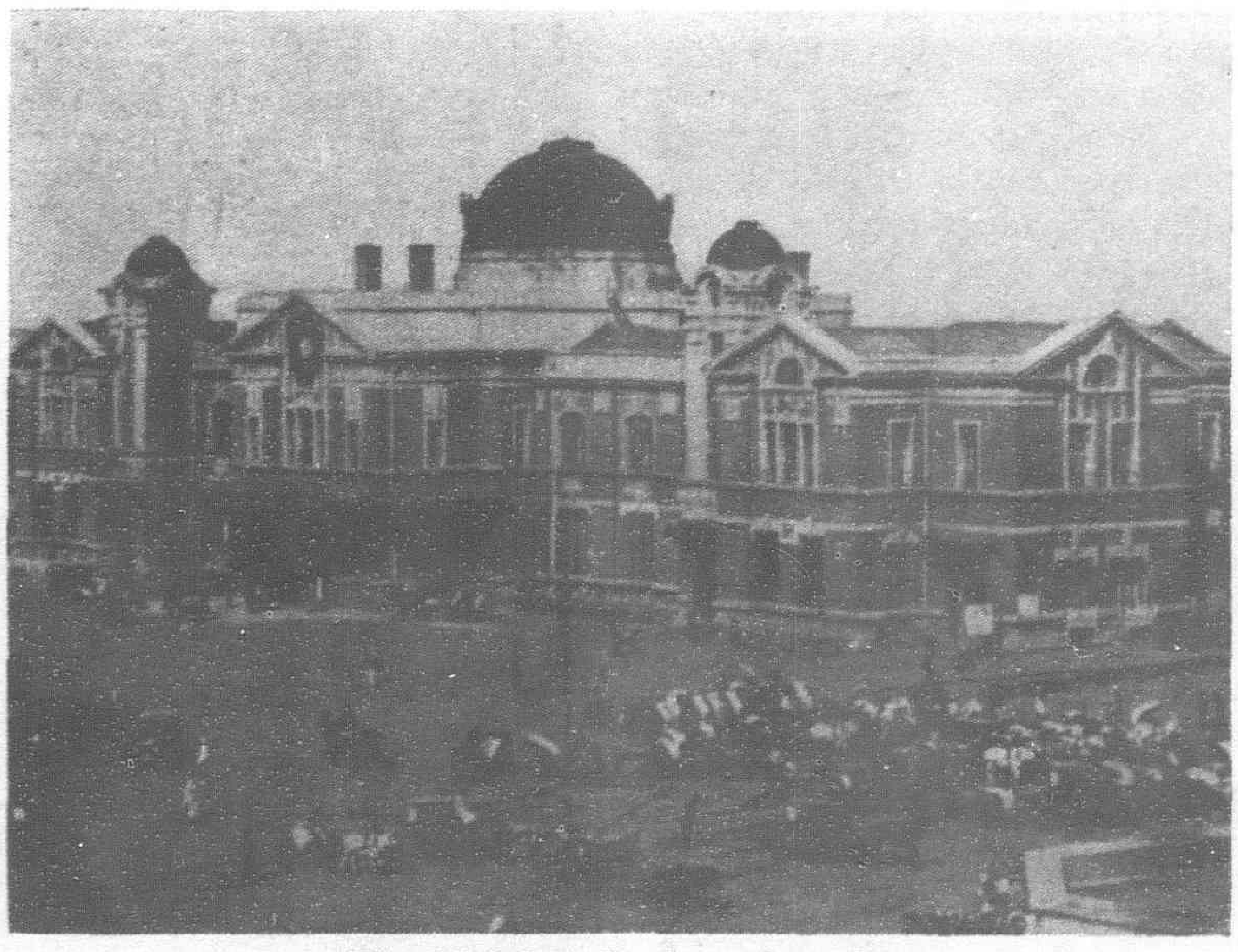
In the construction of the Tunhua-Tumenkiang Railway, the Manchoukuo Government in view of the need of purchasing the Tienpaoshan-Tumen Light Railway, has borrowed the sum of G.Y.6,000,000 from the South Manchuria Railway Company and has also entrusted the management of the said light railway to the South Manchuria Railway Company.



The prominent structures shown in this picture were the Mukden Railway Station of 1907. The difference between the past and present can be seen by comparing these two photographs

Introduced Improvements

The General Directorate is almost as large and comprehensive an organization as the Company's Head Office in Dairen. Since its organization, it has introduced numerous improvements and effected a series of reorganizations in order to transform the neglected lines into a modern railway system. Among other things, it established uniform regulations, fares, rates, and classification on all lines; established through train service with the S.M.R. lines and inaugurated the through booking traffic with the connecting railways; improved the railway tracks and rolling-stock; and introduced sleeping and dining car service. Furthermore, it added the mixed-storage system similar to that practiced by the Company along its lines; developed river navigation and began operation of bus lines on an extensive scale. A rational employees' compensation system, unified and improved schools and hospitals (which were formerly managed by the several railways independently), and a railway training institute were also established. The Company introduced the guard system of its own to assure the safety of railway operation, began operation of hotels at important points, took the initiative in encouraging the development of industries along the railways in co-operation with the inhabitants, and established an up-to-date system of railway accounting and purchasing and statistics. Thus the transportation system throughout Manchoukuo is now undergoing unprecedented rapid modernization and development under the Company's management.



The Mukden Station of to-day

The Railway Act, 1933

Simultaneously with the establishment of the State railway system, the Manchoukuo Government enacted the Railway Act of 1933, on February 9, 1933, after studying the conditions of these railways which were managed by diverse methods, entailing serious loss, and contemplated nationalization of the whole system in order to develop the economic wealth of the nation and maintain national defense and public peace. The law provides that railways shall be under national ownership except those operating in particular localities and not engaging in general transportation. The State Railways adopted the standard gauge of 1.0435 meters (4 feet 8½ inches). In order to carry out the objective of a State railway system, the law provides that the Government shall purchase the privately owned railways. The Government subsequently purchased the Mukden-Hailung, Tsitsihar- Koshan, and the Hulan-Hailun lines. Three new railways—the Lafa-Harbin line, the Koshan-Hailun line, and the Tunhua-Tumen line—extending the Hsinking-Tunhua railway to the Korean border, were built by the end of 1933 under contract with the South Manchuria Railway Company, which constructed these lines and furnished funds amounting to about Y.100,000,000. The Manchoukuo Government also purchased the Tienpaoshan-Tumen Light Railway at the cost of Y.6,000,000 borrowed from the South Manchuria Railway Company.

The Office of the General Directorate of State Railways was established at Mukden and commenced its work on March 1, 1933. It set up harmonious interconnection with the South Manchuria Railway lines, the North Chosen Railways, and other lines. The General Directorate also inaugurated equal freight rates on domestic and foreign goods—the discrimination maintained under the former Northeastern regime being practically done away with. The additional tax on freight hitherto charged under the former regime in the form of " universal or consolidated tax " was also abolished. Improvement of the railway track and rolling-stock, which was utterly neglected under the preceding regime, was steadily and gradually carried into effect. These railways, when under the former regime, employed thirty-five thousand persons for less than 3,000 kilometers, or 11 employees per kilometer. Although so many employees were not required under the new management, the General Directorate did not discharge any of them. It pays their wages and salaries promptly and regularly, in *contrast to the frequent default* in payment of wages under the former regime.*

On March 23, 1935, the North Manchuria Railway was transferred to Manchoukuo with the signing of the historical agreement between Manchoukuo and the Soviet Union. The Manchoukuo Government, under the contract signed on March 23, 1935, entrusted the management of the entire line and its affiliated enterprises to the South Manchuria Railway

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*The S.M.R. Co., *Fourth Report on Progress in Manchuria to 1934*, pp. 184-5.

Company. The General Directorate had enlarged its Harbin Office for the purpose of meeting this added task and took over the operation of the newly acquired lines on the day of its transfer. Thus the historic shift in the management of the North Manchuria Railway was effected without the least interruption in its traffic movement. The General Directorate is now taking steps to bring about the complete renovation, including the change of the gauge, of otherwise decrepit and obsolete lines.

The newly acquired lines have been divided into three sections and re-named as follows:

	Kilometers	*Miles*
Hsinking-Harbin line	240.2	141.1
Harbin-Manchouli line	934.8	580.5
Harbin-Suifenho line	546.4	339.3
Branch lines	7.0	4.3
Total	1,728.4	1,071.2*

North Chosen Railways

The establishment of direct connection between North Manchuria and the Japan Sea had been a problem of long standing. It was realized, at last, with the completion of the Tunhua-Tumen line which made possible the through traffic between Hsinking and Seishin or Yuki, both facing the Japan Sea.

In order to facilitate this through traffic and place it under unified management, the Government General of Chosen entrusted the operation of the North Chosen Railways to the South Manchuria Railway Company on October 1, 1933. In order to meet this added responsibility, the Company established the North Chosen Railway Division with its headquarters at Seishin, taking over the operation of some 205 miles of lines in northeastern Chosen.

With the completion of the Lafa-Harbin and Peian-Heiho lines, this through railway line now penetrates North Manchuria as far as the Amur River, while the Tumen-Ningpei line, with its eventual extension to Chiamussu, opens up the northeastern corner of Manchuria to direct communication with the Japan Sea. This new development will find its eventual gate at Rashin, where a new port is now under construction. In other words, with the management of the North Chosen Railways within its hands and the vast resources of North Manchuria tapped through the Manchoukuo State Railways, the S.M.R. Company, in co-operation with Manchoukuo, has become the pioneer agency in the development of North and Northeastern Manchuria.†

Organization of the R.R. System

The South Manchuria Railway Company is primarily a railway concern and, as such, it occupies a position of predominating importance in the Far East, if not in the world at large. Not only do its superb lines furnish the backbone of the transporation system in Central and South Manchuria, connecting the rich regions of the "granary of Asia" with the outside world through the port of Dairen, but, in addition, they constitute indispensable links in the international rail connection between Japan and China as well as between East Asia and Europe through Siberia. In this latter capacity the South Manchuria Railway lines are as significant as the Trans-Siberian Railway or the Suez Canal.

The total length of the railway lines operated by the South Manchuria Railway Company is 9,655.5 kilometers, or 5,069.3 miles and is distributed as follows:

	Length (in km.)
1. South Manchuria Railway lines	1,129.1
Dairen-Hsinking main line	
Mukden-Antung main line ..	
Port Arthur-Choushuitzu branch line	
Yingkow-Tashihchiao branch line	
Yentai Colliery branch line	
Fushun-Hunho branch line	
Other branch lines	
2. Manchoukuo State Railways	8,182.0
Hsinking-Tumen line	
Chaoyangchuan-Kamisanbo line	
Mukden-Kirin line	
Hsian-Shaho line	
Mukden-Shanhaikwan line	
Koupangtzu-Yingkow (Hopei) line	
Chinlingssu-Peipiao branch line	
Tahushan-Chengchiatun line	
Ssupingkai-Tsitsihar line	
Tsitsihar-Peian line	
Paichengtzu-Solun line	
Ningnien-Morukun line	
Harbin-Peian line	
Lafa-Harbin line	
Chinhsien-Chengte line	
Peian-Heiho line	
Tumen-Chiamussu line	
Hsinking-Paichengtzu line	
Hsinking-Harbin line	
Harbin-Manchouli line	
Harbin-Suifenho line	
Other branch lines	
3. North Chosen Railways	344.4
Seishin-Nanyo line	
Yuki-Tumen line	
Kainei-Shinkeirin line	
Yuki-Rashin line	

The South Manchuria Railway Company is a divisional form of organization in theory. It is unnecessary to discuss the advantages and disadvantages of the divisional plan and the departmental plan in connection with the railroad organization in Manchuria, because it is a foregone conclusion that the divisional plan is more desirable in such a vast territory as Manchuria, as in the case of large Americn railroads.

From the standpoint of effective supervision and prompt and efficient action by the general officials and department heads, the

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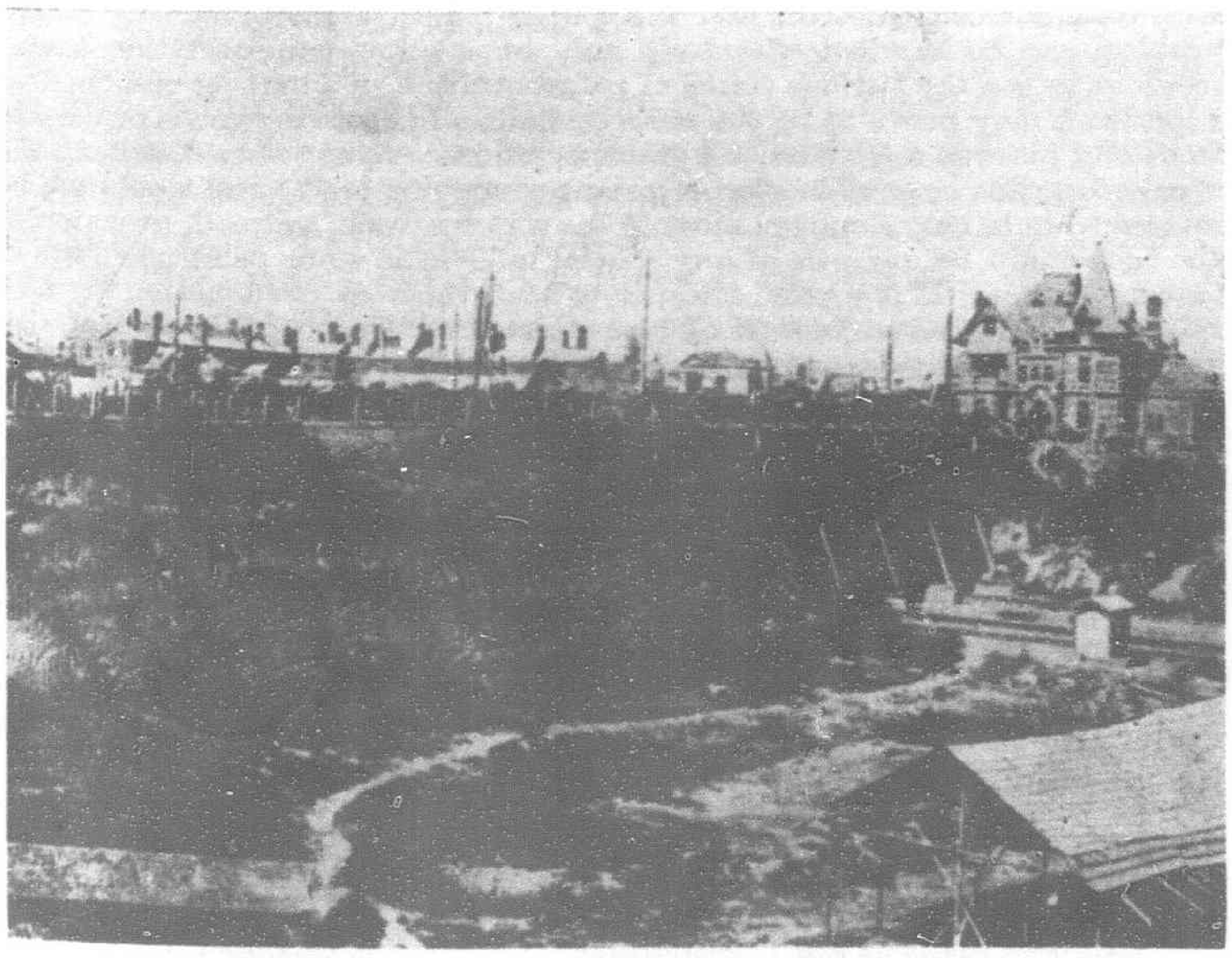
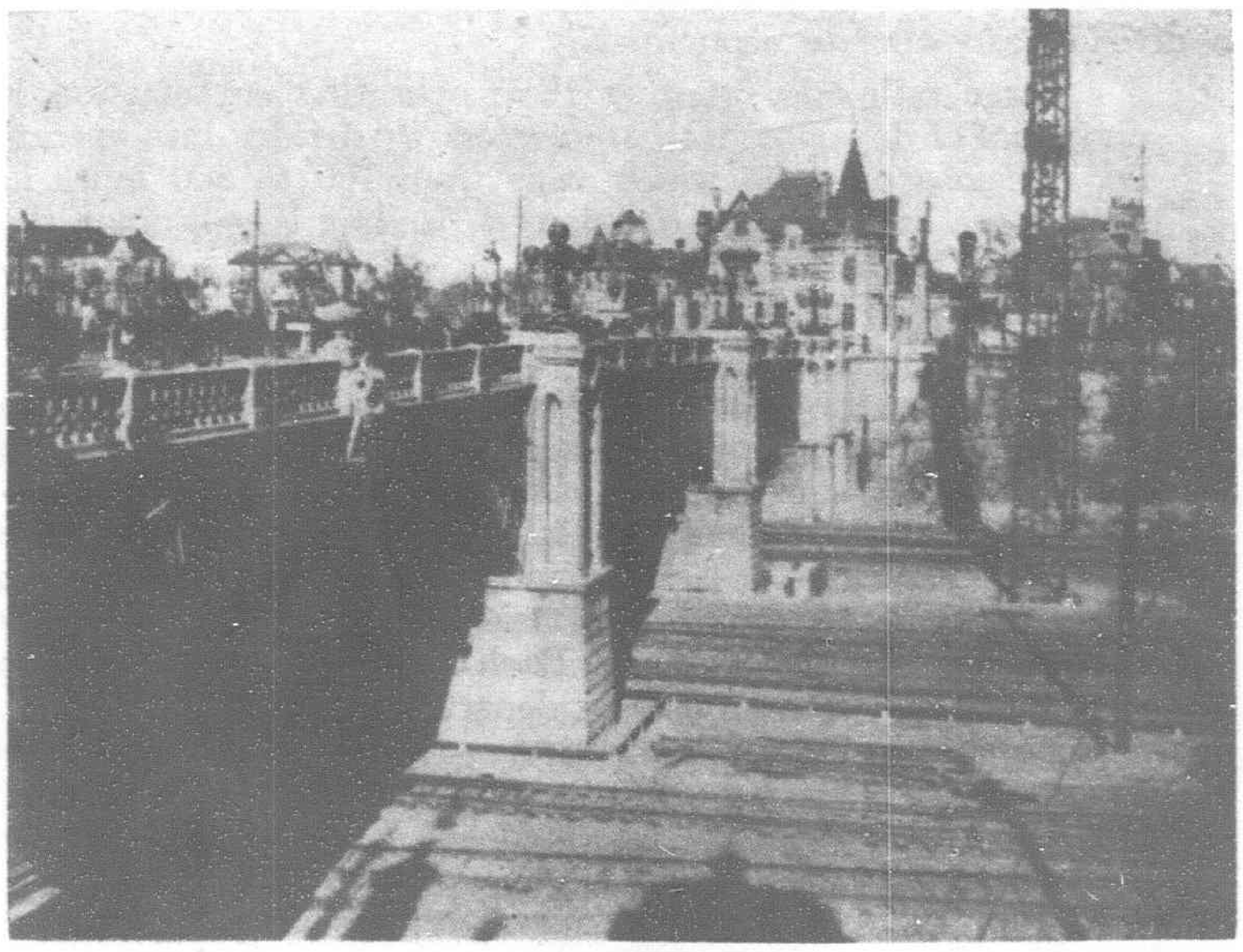
*_South Manchuria Railway Report_, 1935, p. 26.

†The S.M.R. Company, *The Administration of North Chosen Railways*, pp. 27-29.



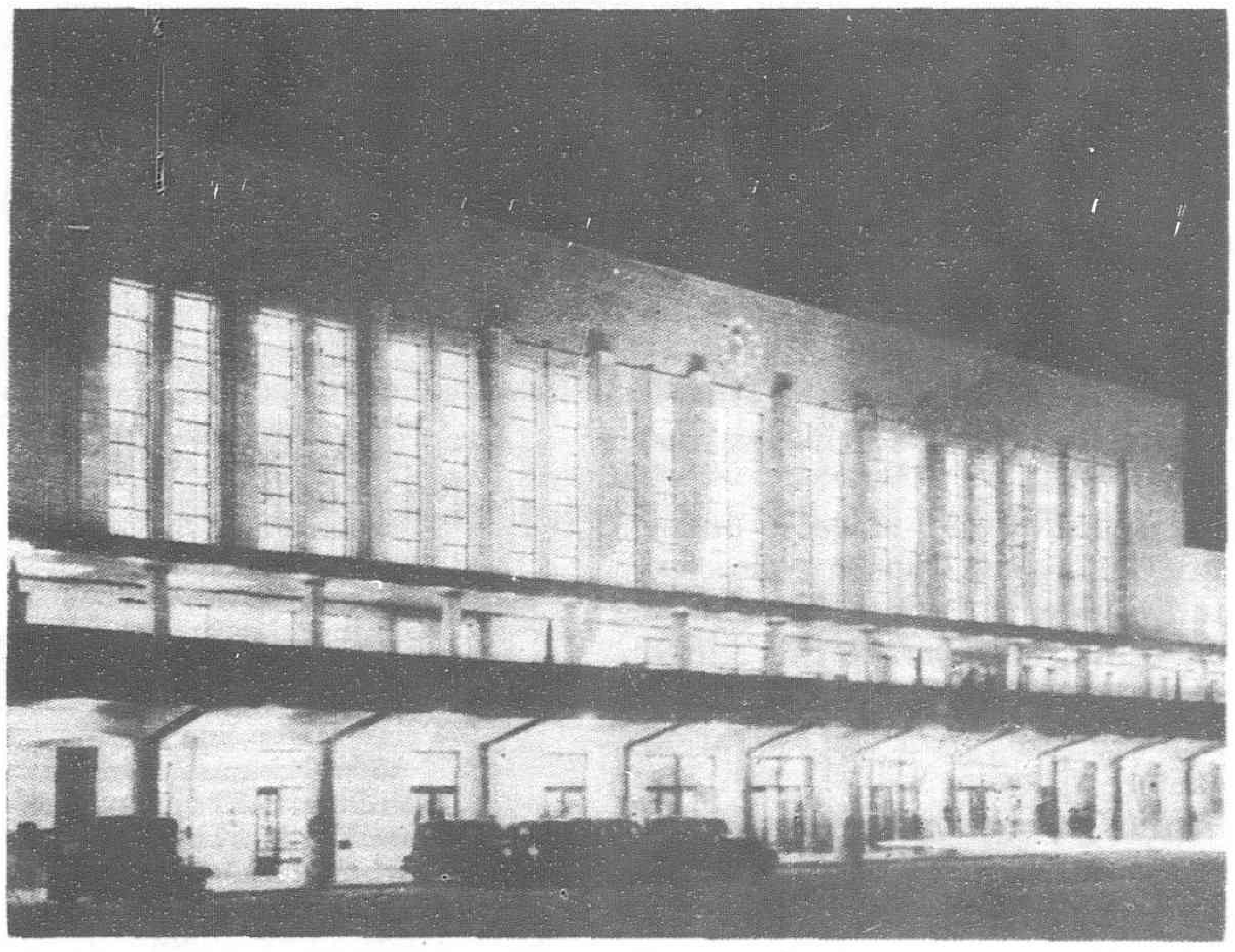
The Nihon Bashi in the vicinity of the Dairen Station, in 1907



The Nihon Bashi as seen to-day. Note the tracks that run below the bridge

railroad organization may be classified into the three general types: centralized, partly decentralized, and regional.*

The entire lines are controlled by the central body, the General Directorate of Railways, whose Director General is the Vice-President of the Company. Reporting to the President, he has charge of all railways, bus lines and inland waterway lines. The two Vice-Directors General, one of them in charge of traffic and the other in charge of engineering, are subordinate to the Director General and are in the Directorate of the Company. Under the Director General there are nine Departments (Secretariat, Document, Personnel, Welfare, Sanitation, Land, Industry, Railway Protection, and Information and Reference) and six Central Administrative Bureaus (Treasury, Traffic, Operating, Mechanical Engineering, Civil Engineering and Architecture, and Construction). In addition, under the supervision of the Director General, there are five regional Railway Directorates, one Railway Division, Railway Workshops, Construction Offices and a Railway Research Institute.



A night view of the imposing Dairen Station which was completed recently. It is reputed as one of the Orient's best

Regional Railway Directorates

The Manchuria railway system is divided into seven semi-autonomous districts with a chief in charge of each—each chief and his general staff being located at a point directly on the line assigned to him. These offices are called Railway Directorates, namely the Mukden Railway Directorate, the Harbin Railway Directorate, the Kirin Railway Directorate, the Tsitsihar Railway Directorate, the Chinchou Railway Directorate, the Mutankiang Railway Directorate and the North Chosen Railway Division. The following table gives the length of railways under the jurisdiction and operation of each Directorate.

Directorates	*Kilometers*
Mukden Railway Directorate	1,129.1
Chinchou Railway Directorate	1,635.9
Kirin Railway Directorate	1,329.8
Mutankiang Railway Directorate	1,303.9
Harbin Railway Directorate	1,588.5
Tsitsihar Railway Directorate	2,323.9
North Chosen Railway Division	344.4
Total	9,655.5

Huebner and Johnson state with respect to the mileage which a division can operate economically:

> Large railroads, whether their operating organization is divisional or departmental, are necessarily divided into operating divisions or units which vary from 100 to 800 miles in length, the length of the divisions depending largely upon the volume of traffic.†

As can be seen from the foregoing table, the average length of railways under each Directorate is about 1,600 kilometers.

In contrast to the American Divisional Superintendents, who are under the supervision of the General Superintendent, as in the case of the Pennsylvania Railroad, the Norfolk and Western Railroad, and others, the Manchuria Railway Directorate Chiefs are subordinate to the Director General and have a considerable extent of power in their respective regions. They are the Directors General of their respective regions. Each of these regional Directors General is assisted by the following department heads:

Manager of General Affairs Department
Manager of Treasury Department
Manager of Traffic Department
Manager of Operating Department
Manager of Engineering and Architecture Department
Manager of Electrical Engineering Department
Manager of Industry and Land Department

Under the supervision of the regional Director General there are the Wharf Office, the Architecture Offices, and Hospitals.

New Thoughts on Transportation

In recent years there has been a great and very significant shift of emphasis in discussions on transportation. Public thinking has been rapidly moving from the consideration of particular types of transportation agency—railroads, waterways, highways, and airways—to transportation in general. Discussions thus, now commonly relate to the transportation system of the country and ways and means of co-ordinating and articulating the several types of public carrier into a unified whole. As a natural accompaniment of this shift of emphasis, the conception has been emerging that what we are interested in fundamentally is transportation service for the people of the nation. Every other consideration is secondary to this basic one.

In pursuit of this objective there should be no predisposition to favor any particular type of transportation agency. The primary requirement is that freight and passenger traffic shall actually move by the particular transportation agency, or combination of agencies, which can carry it, all elements of cost considered, in the most economical and serviceable way.

Harold G. Moulton, President of the Brooking Institution, *emphasizes the need for companies providing all forms of transportation.* To quote:

> We cannot expect to have genuinely effective co-ordination in the common business of transporting goods so long as our transportation agencies remain as separately organized competing companies. Our goal is a system which will make it possible to move goods from points of origin to point of destination at minimum cost—which may mean in one case that the goods will move all the way by rail, in another all the way by highway, and in still another by water, rail, and highway. So long as the various agencies of transportation are completely independent, each one always desires to move the traffic all the way, or as far as possible, over its facilities, and there is always an attempt to make rates so as to accomplish this purpose. The reason, of course, is that, once loaded and on the line, the cost of moving goods for added distance is relatively small. Railroad history is replete with illustrations of this principle.
>
> This problem cannot be solved by having the Government arbitrarily adjust rates so as to make traffic move part way by one agency and part by another. The question of the cheapest rate, all factors considered, varies with different consignments and the special requirements involved. Such a problem can be handled effectively only by a single transportation having freedom to use the various forms of transportation in whatever combination experience may prove to be the most economical in moving goods or persons from any place to anywhere. A transportation company would seek out the cheapest means or combination of means of moving traffic and would not be interested in having it moved most of the way by truck, railroad, or water, as the case might be, because of any special interest in some particular form of transportation. If it proved cheaper to send them by combination method, they would use several forms of transportation. Through experimentation we would gradually ascertain the proper place of each type of transport; and if some proved to have no legitimate field they would cease to be used.
>
> The establishment of transportation companies would of course mean the abandonment of competition between the various types of transportation agency as a means of regulating rates. The transportation business would become more completely a monopoly than ever before.‡

The South Manchuria Railway Company is virtually "a company providing all forms of transportation" in Manchuria, operating all railroads and motor and inland water transportation under direct management, and ocean and air transportation under its subsidiaries.

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*Huebner and Johnson *Railroad Freight Service*, pp. 462-466.

†Huebner and Johnson; *op. cit.*, p. 461.

‡Address made at the Transportation Conference, Chamber of Commerce of the United States, at Washington, D.C., which appeared in *Railway Age*, Sept. 7, 1935.

Korea's Gold Deposits

By *JAMES BICHAN*, A.R.S.M., *in The Mining Magazine*

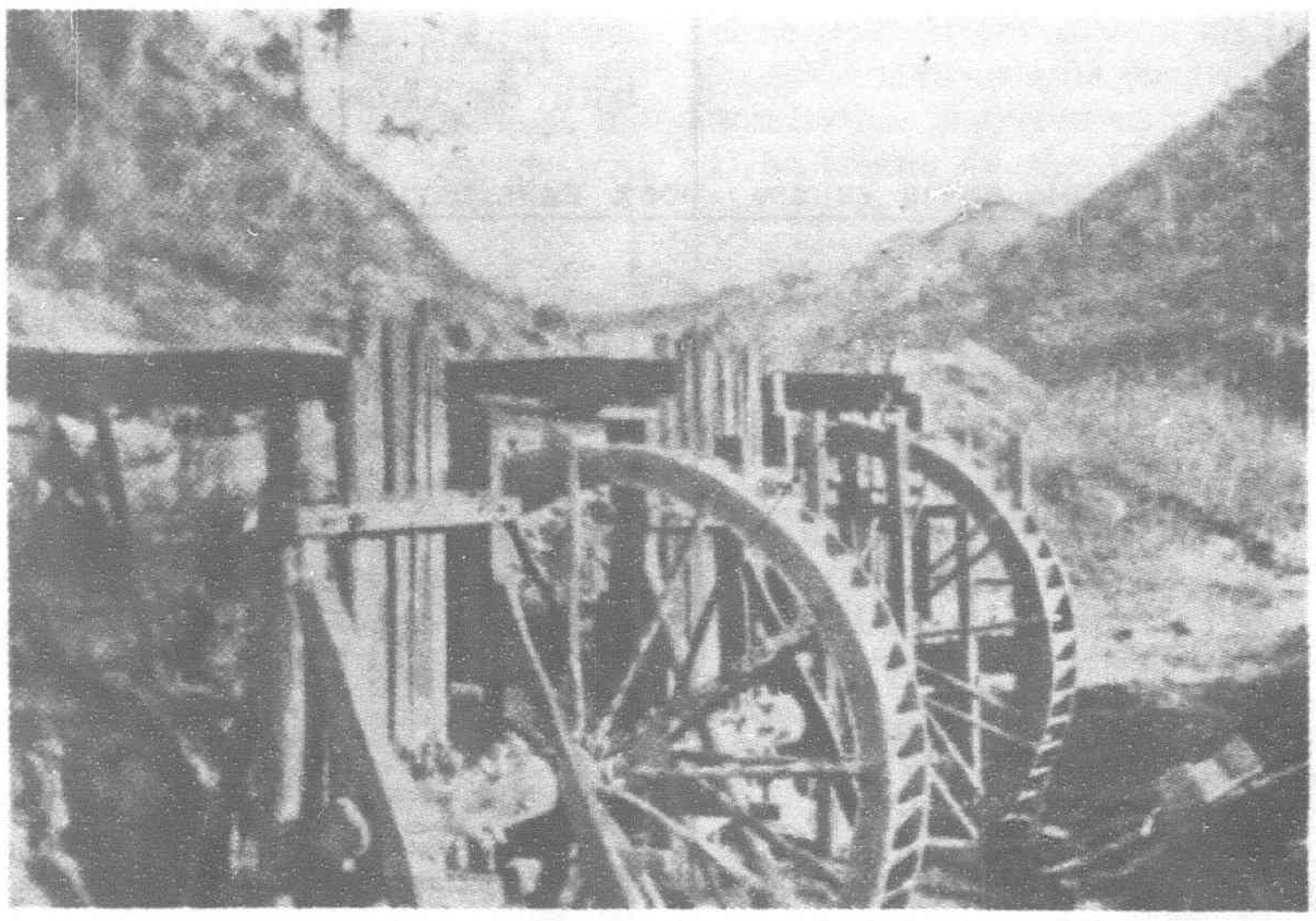
The village of Kapam, in the Shojo district of the North Heian Province, Korea, is located on the south bank of the Yalu River, immediately east of its confluence with the northerly flowing Nam Chang Creek. The tributary is about eight miles in length and enters the river at a point some 80 miles from the sea.

Numerous interesting occurrences of gold mineralization are found on either side of the Nam Chang valley and in parallel valleys for a radius of ten miles from Kapam village. Certain of the deposits in the vicinity of Sak Ju are being worked by Japanese and a few are exploited by local interests, others have been prospected and developed by a subsidiary of a company that was once mainly British-owned, but which has now become entirely Japanese.

The information presented, while applying equally to most deposits of the area, has been derived mainly from a study of the holdings of the latter concern. Nearly all of the veins can be explored from adit cross-cuts to a depth of several hundred feet below outcrop.

Geological Background

Gold-bearing veins in the area are found enclosed within a country rock of highly-metamorphosed sediments that grade imperceptibly through various schistose members to a definite granite. The metamorphics are presumably of Carboniferous age and formerly consisted of a series of shales, sandstones, and limestones, with intercalated carbonaceous beds that may have been coal measures. They now constitute a remnant of altered rocks that have escaped erosion since the granitic invasion of the terrain.



Native Water-Mill in the Nam Chang Valley. Here numerous interesting occurrences of gold mineralization are found

The granite contact forms a natural basin upon which the metamorphosed sedimentaries now rest, the granitic magma being derived from the sediments by liquefaction as they were depressed into higher temperature horizons of the earth's crust. Transitional rocks consist of alternate bands of wholly-or partially-recrystallized sediments. Sandstones have been recrystallized to quartzites and the more refractory beds have thus retained their individuality. The less refractory members have recrystallized to a rock of granitic appearance consisting mainly of quartz and felspar. These grade into the granite itself, which has been called the "blue granite," owing to the characteristic appearance of the quartz.

Dykes of both acidic and basic composition are common features and, together with an intrusive aplitic granite, termed the "white granite," are all of later age than the gold mineralization. Faulting on a large scale has occurred, but is localized along two general directions that are almost at right angles with one another. This has broken up the country into separate blocks having dimensions in the horizontal plane of several thousands of feet. Within the borders of these areas the outcrops of the veins may be traced fairly consistently. Erosion has cut deeply into the surface along the lines of the wider fault zones, forming a natural system of major valleys, of which that followed by the Nam Chang Creek is one. Many small branch valleys are localized along the subsidiary faults of the neighborhood.

Vein Systems

The gold deposits found within the altered sedimentary rocks make their appearance throughout a series exhibiting widely varying degrees of metamorphism. The veins occupy shear fractures and tension fissures resulting from torsional stress. The horizontal components of the intra-crustal pressures set up shearing stresses that were relieved along two directions at angles of approximately 15° and 120° respectively from true north. The pressure was thus apparently oriented in two directions—south-south-east and north-north-west—in order to give rise to the observed shearing. The dip of the 15° shear is at an approximate angle of 30° to the east, while its complementary shear dips at about the same angle to the south-west. The latter is localized along a carbonaceous horizon for some part of its length, evidenced by the presence of much graphitic material. Fig. 1 illustrates diagrammatically the pressures and their effect. A slight thrust movement may be observed along the shear planes. This system of shear planes is rarely well mineralized in this region, although in other parts of the country the same type of fissure is host to ore-bodies of considerable value. Locally the movement along the planes where they have intersected the second system of vein fissures is their only characteristic of importance.

The tension fissures were formed through the agency of torsional stresses* set up as a direct result of the relative effects of the magmatic pressure and the weight of the overlying crust in the neighborhood of the sedimentary rock mass while the granite was still liquid. The derivation of these stresses is not of such importance as their effect, which is illustrated in Fig. 2, showing the two complementary systems of veins of this type thereby formed. These veins strike approximately east-west and dip steeply, one set to the north, the other to the south. Lenticular masses of valuable material fill parts of these fissures. There also exist other fracture systems, but these two types are the only ones of economic significance. In the case of other systems, either their age or the structural conditions existing locally have been unfavorable for vein formation other than on a minute scale.

The nature of the tension fissures depends upon the country rock. Fracturing has been concentrated along one, or, at most, two lines, where the zone crosses the more highly metamorphosed members of the sedimentary series. The main fractures and associated fissuring in the less altered beds may form a zone up to 70-ft. in width, containing isolated lenses of ore, occurring along certain definite lode lines, and also *en echelon*. The ore-bodies are in all cases lenticular and pitch to the west at a steep angle. The pitch of anticlinal structures discernible in the sedimentaries is also in the same direction, although at a flatter angle.

Mineralization

As a result of the faulting that occurred after the ingress of the quartz, it is now possible to observe the sequence of mineralization throughout its several stages. Starting with the deposition of barren quartz in the most highly metamorphosed rocks close to the granite contact the processes may be traced through the stage of gold and sulphide mineralization to the horizon of barren quartz

(*Continued on page 320*)

**Vide, Can. Min. Journ.*, November, 1935; "Ore Deposits Follow the Synclines."

Condition of the Kowloon-Canton Railway

By R. D. WALKER, M.INST.C.E., M.INST.T., Manager and Chief Engineer of the British Section of the Railway

THE 1937 period was marked by vicissitudes. It can be recorded as the most eventful twelve months in the history of the Kowloon-Canton Railway. Abnormal occurrences in chronological order, were a disastrous fire on the Up Through Fast train in January, resulting in the death of 84 persons; a major derailment of the same train twelve days later; record passenger traffic during the Ching Ming festival in April and the Coronation celebrations in May; linking-up of the Canton-Hankow and the Canton-Kowloon Railways in August; the subsequent introduction of a working agreement for through goods traffic between Kowloon and Hankow; use of all available space on the Railway Reclamation at Kowloon for storing cargo originally destined for Shanghai but diverted to Hongkong owing to Sino-Japanese hostilities; intensive damage to track and the total suspension of traffic for ten days caused by a record typhoon in September; and lastly, the intensive bombing of the Chinese Section of the line from October to December which caused dislocation of traffic, damage to rolling stock and the ultimate cancellation of the through morning and mid-day passenger trains.

The year opened with strength and confidence, brighter conditions prevailing due to the improvement in trade. All revenue figures, however, are somewhat vitiated as indices of comparison by two over-riding considerations: firstly, the Sino-Japanese conflict which affected all sources considerably from August, and secondly, the cessation of both Shum Chun Casino traffic and express train haulage which resulted in a loss in earnings, as compared with 1936, of approximately $193,000.

Receipts and net operating revenue were $1,331,468.73 and $436,935.30 respectively, as against $1,245,469.16 and $454,733.00 the previous year. These results are considered to be very satisfactory, the increase in receipts over the revised estimated earnings, which were prepared in October, 1936, when the full effect of the closing of Shum Chun Casino could be gauged, being more than 30 per cent. Substantial advances were obtained from through goods traffic, through passenger traffic and rents. All sources registered gains with the exception of local passenger traffic and auxiliary operations, which were affected adversely by the circumstances outlined above.

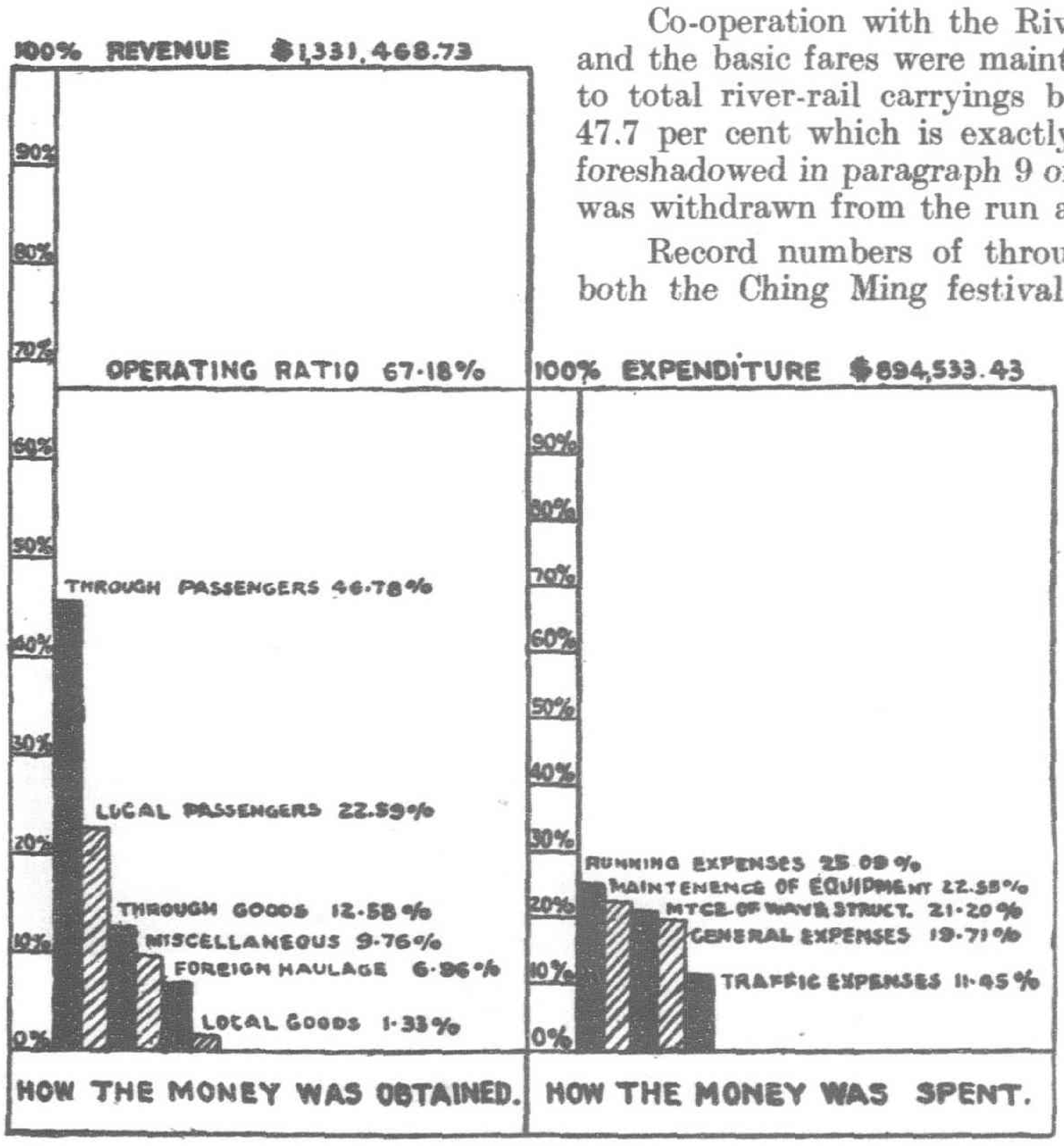


Chart showing financial results of the Kowloon-Canton Railway during 1937

Operation Costs Increase

Operating expenditure was $894,533.43, compared with $790,736.16 last year. The increase is ascribable principally to typhoon damage which involved the Railway in abnormal expenditure to the extent of $80,883, and in a lesser degree to a considerable rise in the price of coal which affected running costs by $32,177. But for these two factors, less money would have been spent than in 1936.

Traffic features of the year were a further advance of through passenger, and a large increase in through goods earnings. Terminal and sectional through passenger receipts were up 3.17 per cent and 23.69 per cent respectively, despite the total suspension of traffic for a total period of 17½ days, and the cancellation of the morning and mid-day expresses during the last three weeks of December. Revenue from both these sources constituted new records for this Railway. The most pleasing result, however, was the unexpected rise in through goods receipts which soared from $44,694.93 to $167,556.45. Nearly two-thirds of the total earnings from this source were obtained during the last three months of the year when the working agreement for transit goods was in operation.

The most serious calamity which this Railway has experienced since its inception occurred on January 16 when a fire broke out on the mid-day fast train at mile 74 on the Chinese Section. The train was filled to capacity and the loss of life was heavy, there being 84 dead and 30 persons injured. Twelve days later, the same train was involved in a second accident at mile 42 on the Chinese Section which caused damage to stock but not to passengers.

Co-operation with the River Steamboat Companies continued and the basic fares were maintained. The percentage of railborne to total river-rail carryings between Hongkong and Canton was 47.7 per cent which is exactly the same as the 1936 figure. As foreshadowed in paragraph 9 of last year's report, the s.s. *Fuk On* was withdrawn from the run at the end of March.

Record numbers of through passengers were carried during both the Ching Ming festival held in April and the Coronation celebrations in May. The results obtained reflected the general economic recovery and the consequent increase in the spending power of the public. During the four days preceding Ching Ming, the through passengers conveyed northwards reached a new peak figure of 20,726, an increase of 38 per cent over the previous maximum carryings of 15,038 obtained in 1935. Then again, on May 11, the day before the Coronation of Their Majesties the King and Queen, 10,684 through passengers were transported to Kowloon in nine expresses, constituting a new record for southbound traffic.

New Coach in Service

The "Canton Belle," the second streamlined parlor railcar, was placed in service in May. This car, like its sister car the "Taipo Belle," became extremely popular. In addition to normal use in local traffic, it was chartered on five occasions to run as a special to Canton. This latter usage was discontinued during October on account of the risks involved.

An air-conditioned lounge car of the ice-activated type was constructed in the Railway Workshops and placed on the Canton run in June. This car, called the "Aurora," aroused great public interest, as it was the first of its kind in China. The increased patronage surpassed the most sanguine expectations, and it was necessary to institute a booking fee of 50 cents to cope with the great demand for seats. The results obtained have led the Chinese Section to plan the construction of two similar coaches. Unfortunately, owing to hostilities between China and Japan, it was considered desirable to withdraw the car from service in September.

The most noteworthy event of the year was the construction of a loop connecting the Canton-Hankow and the Canton-Kowloon Railways. This connection, which is approximately nine miles in length, runs practically due east from Sai Chuen, a station 4¾ miles north of Wongsha (Canton West), to Shek Pai Junction, five miles from Tai Sha Tou (Canton East). The final junction with the Canton-Kowloon Railway was made on the night of August 17/18. The first train to reach Kowloon via the loop consisted of nine 40-ton covered goods wagons which carried bullion from Hankow. This train arrived at 9.28 a.m. on August 27. Since that date many goods trains and three passenger trains have completed the 791 miles journey between Kowloon and Wuchang.

A working agreement for through goods traffic between the Canton-Hankow Railway and the Chinese and British Sections of this Railway, was drawn up in September. Pending ratification by the Ministry of Railways and the Hongkong Government, the Railway Administrations concerned agreed to adopt its provisions with effect from October 1. To prevent confusion with "through" traffic on the Canton-Kowloon Railway, all through-through traffic passing over the loop is called "transit" traffic. The British Section is compensated for the disproportionate relationship between its route and terminal mileage by the imposition of station terminal charges. The lowest charge is 20 cents per ton for class six goods and the highest is 50 cents per ton for higher value goods. The agreement terminates on October 31, 1939, when it is expected that it will be renewed either in whole or with such modifications as are found by experience to be desirable.

When Hongkong and Hankow were linked by rail, it became necessary to investigate the possibilities of constructing an adequate Goods Terminal at Kowloon, the existing facilities being based on the fact that goods receipts did not bulk large in total operating revenues. Three schemes were devised; the first to cater for probable goods movements during the period of Sino-Japanese hostilities; the second to be used when normality is restored and the growth of "transit" traffic requires the provision of godowns and their concomitant sidings; and the third to be put in hand when the hinterland has been developed to such an extent that the demands of traffic can only be met satisfactorily by new modern wharves and transit sheds.

Growth of Traffic

The problem which had to be solved in drawing up the first scheme was to provide maximum facilities at low cost, in the shortest possible time. A few new sidings were constructed at specially selected points and a five-ton mobile crane and two small shunting engines were obtained from the Shing Mun Waterworks. This enabled traffic to be dealt with in a reasonably satisfactory manner as the key factor governing the volume of goods handled was not the capacity of this Section, but the difficulties experienced in obtaining a regular and sufficient supply of goods wagons from the Canton-Hankow line. The growth of traffic during this period can be gauged from the fact that foreign goods receipts for the month of December were $43,243, compared with $44,695 for the whole of last year.

The second scheme provides for a new Goods Terminal on Kowloon Railway Reclamation estimated to cost $650,000; while the third is based on proposals made to the Hongkong Government by the Consulting Engineers Messrs. Coode, Fitzmaurice, Wilson and Mitchell in November, 1922.

The worst cataclysm which has ever befallen the Railway took place in the early hours of September 2, when a record typhoon, with a maximum wind velocity of 167 miles per hour, struck Hongkong. More than 6,000 lineal feet of embankment were washed out in a seven miles stretch between Shatin and Taipo Market, where the line fringes Tolo Harbor. The damage was caused by a tidal wave which swept through Tolo Channel and deployed along the western margin of the land-locked sea. Three main banks, each 25 feet in height and 1,200, 500 and 300 feet in length respectively, composed of earth filling pitched with granite blocks, were demolished by this wave which reached a maximum height of 30 feet above mean sea level. All traffic was suspended until the evening of September 10 when a ballast train was able to pass over the damaged section. One day later, one through passenger train in each direction was allowed to run between Kowloon and Canton and, on September 13, the normal train service was resumed at restricted speed. Between September 2 and September 10, an average of nearly 2,000 coolies had been employed daily, in night and day shifts, to effect temporary repairs. Speed restrictions were removed on November 8 and consolidation work was completed on November 24. The total cost of rectifying typhoon damage was $80,883.

Chinese Build Cars

Negotiations were completed in October for all through and transit goods consigned to Kowloon Station from Canton and from points along the Canton-Hankow Railway to be invoiced on forms which are marked "Subject to completion of Chinese Customs requirements at Kowloon." Failing adjustment of these requirements, the British Section is empowered to return the goods to the Chinese Customs Station at Shum Chun just over the border. Movement of exports from China will be facilitated by these measures.

Considerable work was performed for the Chinese National Railways during the last five months of the year. This included the erection of three first-class sleeping cars for the Canton-Hankow Railway and major repairs to locomotives and wagons.

The Hongkong & Whampoa Dock Company's premises were linked to the main railway system in November by means of a track laid down Baker Street. This connection affords rail access to a 100-ton tower crane which will be completed early in 1938. This crane is located alongside water which is deep enough to accommodate the largest ocean going ships. It is expected that additional revenue will accrue to the Railway both in freight and special siding charges.

The Chinese Section of the line was bombed regularly by Japanese aircraft during the last 2½ months of the year. Altogether 726 bombs were dropped from 344 planes in 81 raids on 49 different days, 140 of these missiles being aimed at the two large bridges over the East River at Sheklung. Three types of bombs were used, weighing 500, 250 and 60 kilograms respectively. The suspension of through traffic caused by these attacks aggregated 7½ days, the longest interruptions occurring on the three occasions when heavy bombs hit the centers of deep embankments. The Engineering Department of the Chinese Section deserves the greatest credit for the rapidity with which communications were restored.

While the air raids were in progress, two British Section third-class carriages and one 30-ton open wagon, all employed on the through service, were seriously damaged by bombs, necessitating major repairs, while one locomotive and seven wagons were impaired by machine-gun bullets.

As the result of the bombing, punctuality figures, both local and foreign, have suffered severely. All through trains, on and from October 14, have been subjected to long delays, and this has influenced the service considerably.

Running statistics have been affected so adversely by the abnormal conditions prevailing during the year that comparisons with previous figures are of little value. Every endeavor was made, however, to work as economically as possible.

Activities Extended

By December, all available space on the Railway Reclamation, Kowloon, was occupied by cargo originally consigned to Shanghai but diverted to Hongkong owing to the Sino-Japanese conflict. Areas totalling 518,190 square feet had been leased out to various firms and organizations for storage purposes, the rental aggregating $13,463 a month. Included in these plots was the space occupied by a permanent godown measuring 200 feet by 120 feet which was erected by Messrs. Marsman, Hongkong, China, Limited, to warehouse goods which could not be stored in the open. In addition to the above, 22 Wagons-Lits cars were accommodated in three new sidings constructed at the cost of the International Wagons-Lits Company.

The activities of the Railway have been extended considerably by the connection to the Hankow line, and additional staff will be required early in 1938 to cope with the steadily increasing goods traffic.

The outlook for the coming year is obscure, due to the shadow cast by the hostilities in China. Considerable gains are expected under the revenue heads Through Goods Service, Incidental Revenue and Rents, while it is probable that there will be a large decline in Through Passenger receipts. Expenditure will be affected to a marked degree by the phenomenal rise in the price of coal which is at present nearly double this year's contract rate. Financial prospects when peaceful conditions are resumed, are however, most encouraging; at no time in the history of the Railway has the future appeared more hopeful.

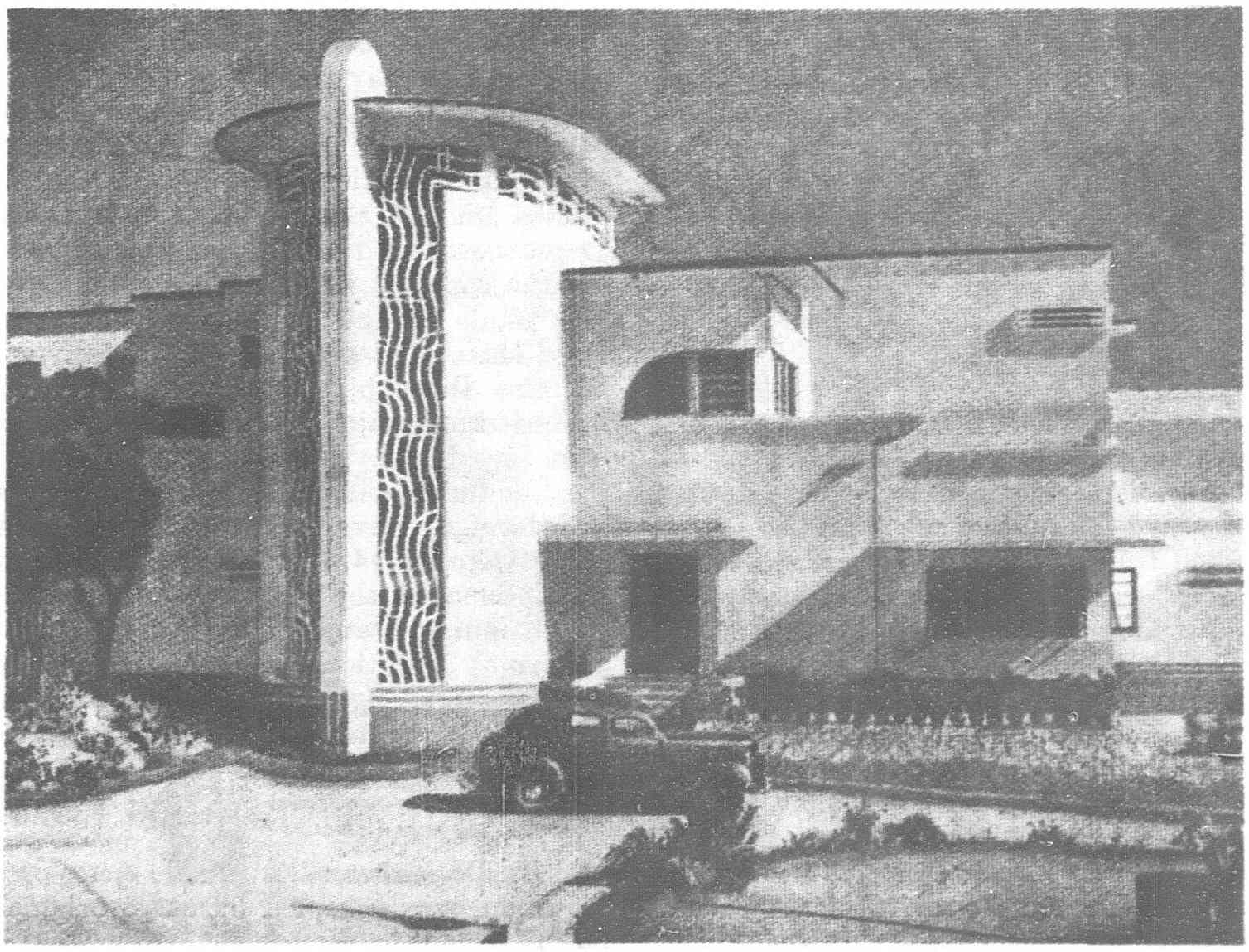
The Growth of India's Cement Industry[*]

THE rapid development within recent years in the manufacture of Cement, one of India's youngest industries; the great part which that industry plays in the economic and national welfare of the country; and the wide scope for building up cottage industries offered by its subsidiary products—these factors will naturally rivet the attention of every right-minded individual interested in the current problems of the country and make him wonder how and by what agency this pre-eminent situation has been brought about.

It is the intention of this article to trace as briefly as possible the growth of the Cement Industry in India, the useful service which the organization controlling it is rendering to the nation and its potentialities in respect of every feature of the national program for rural re-construction and the uplift of the country.

The majority of people are unaware that Cement is not a new invention; it was known to the Romans in classic days and also to the Indians of old, as is evidenced by the roads and castles built in Britain by the former and by the prescription for the compounding of a special enduring mortar given in the Brihat Samhita written by the gifted Indian author, Varaha Mihira. The art was lost for some centuries but was revived and vastly improved by John Smeaton, an eminent English engineer, in the third quarter of the 18th century. The real credit, however, must be awarded to James Aspdin, an English bricklayer, for the discovery of the Portland Cement of the present day and the establishment of the first cement plant in 1825.

It was due to the enterprise of the South Indian Industrials Ltd., Madras, that the first Cement factory in India was opened in Madras in 1902. The capacity of the plant was exceedingly small and the methods employed were far from being technically efficient according to present day standards, and probably due to these factors and also to the high cost and lack of encouragement the factory had latterly to close down.



A reinforced concrete building in Hyderabad Deccan, incorporating modern designs

1912 Saw Its Start

It was actually in 1912 that the real foundation of the present industry was laid down. The Indian Cement Co., Ltd., was registered in that year and started work in Porbandar. The next two years saw the formation of the Katni and Bundi Companies. These factories were also of restricted ouptut to begin with. However, the Great War broke out when they were still in their infancy and left them without competition to cater for practically the whole of India's Cement requirements. The success of these factories naturally lent a fillip to industrial promoters in the country with the result that no less than nine large factories were set in operation in 1923.

Unfortunately, in their enthusiasm and optimism, the manufacturers overlooked the essential fact that India is a conservative country, slow to change its habits, its customs, and its building methods. The result was overproduction, far beyond the demand. Again most of the factories had been erected within the geographical marketing areas of the already existing factories. These two factors inevitably led to internal competition and rate war; the scramble for business at any price and for delivery over any distance crippled the industry; two factories were forced to go into liquidation and the others sustained serious losses.

The Cement manufacturers who were now brought to their senses, realizing the gravity of the situation, joined hands and appealed to Government for protection against foreign competition. They were not able, however, to obtain any relief as the enquiry by the Tariff Board revealed over production which had been intensified by undue competition in the market. The Board made a recommendation for the grant of a subsidy, but when this was not accepted by the Government of India the only course open to the manufacturing companies, if they wanted to survive a catastrophe, was to adopt a policy of co-operation. As a result of this wise decision the Indian Cement Manufacturer's Association was formed in 1925. This Association successfully directed their efforts towards the stabilization of the prices at an economic level which gave a new lease of life to the industry.

Publicity Pays Dividends

The next step was to develop a market for the excessive output. No trading concern, however large the organization or however strongly established, can afford in these days of commercial enterprise and competition to dispense with its propaganda branch whose constant aim should be to keep the public informed of the superior merits of its products. On this principle the Concrete Association of India was next inaugurated in 1927, an organization to educate the public in the use of Cement and to offer free technical aid and advice. The useful propaganda work of this Association soon bore fruit. The free distribution of a full range of literature showing, from every point of view, the superiority of Cement concrete as a building material and the various uses to which it can be put, together with the issue of a monthly publication entitled the *Indian Concrete Journal* containing articles on the various phases of Concrete Construction, instructive both to the layman and to the Concrete Engineer, brought about that most desired effect, viz., faith in Cement and the development of a Cement-minded nation. The result was naturally sustained increase in consumption and the industry steadily advanced.

The ever-growing demand for Cement called for closer co-operation between the manufacturers, and in 1930 another progressive step was taken in the formation of the Cement Marketing Co. of India, Ltd. Under its auspices the selling arrangements of the member companies were centralized. The output of all the factories was controlled on a quota basis. Amalgamated funds also rendered it possible to apply the whole force of effective advertising and propaganda programs to the betterment of sales, instead of having to dissipate a large portion of the money available in keeping each particular Brand name before the public. The selling price also was substantially reduced. In conjunction with the Concrete Association, offices were opened in the chief cities of India and staffed with competent engineers trained in Cement Concrete work.

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[*] From the *B.B. & C.I. Railway Magazine*, Bombay.

A Cement dealer or stockists was made available at every important place so that Cement could be distributed in small or large quantities to the consumer at the minimum cost. Through these dealers and stockists the public were instructed in their own language how to use Cement for the thousand-and-one purposes for which it can with benefit be employed.

Weather-Proof Packing

As a result of experiments made, a new weather-proof packing was introduced for use during the monsoon period or for occasions when cement had to be transported over long distances or held in stock over long periods. This method proved to be extremely satisfactory. By the adoption of a sound policy and by sustained publicity, Cement, as in other countries, was slowly but steadily accepted as an economical building material, thus giving an impetus to the development of modern methods of construction in reinforced concrete. In spite of the fact that the Cement Marketing Company were in this way able to achieve phenomenal success in promoting sales throughout the country, at the same time they were laboring under a heavy handicap in that the quota system upon which they had to work had its limitations as regards flexibility to keep pace with the rapidly growing demand.

If the industry were to continue to be capable of economic expansion and development or even retain its existing measure of prosperity, a more adaptable arrangement was imperative from the point of view not only of distribution but also of its capacity to erect new factories to serve those areas where the demand tended to be in excess of the existing economic supply.

With this end in view a merger company was formed with the main object of consolidating and re-organizing the entire business of the various cement manufacturing companies, not only in respect of sales and selling prices but also in regard to manufacture, administration and the erection of new factories where and when needed, together with the all-important matter of economic distribution.

Such a merger offered possibilities of considerable saving on bulk purchases of Indian coal, jute bags and other stores required by the industry. The quota system could be abolished and the fullest advantage taken of the production capacities of the existing works favorably situated with regard to the markets, whilst production in the less economic centers could be restricted.

The advantages and future possibilities of the merger scheme were so overwhelming and convincing that it received the unqualified approval of that far-seeing industrial magnate, the late Mr. F. E. Dinshaw, and it finally became an accomplished fact in August, 1936, under the name of the Associated Cement Companies of India, Ltd.

Under the new regime special attention has been given to publicity activities. In addition to intensive advertising in newspapers and journals throughout the country, the free distribution of booklets, and the detailed study of new problems in the *Indian Concrete Journal*, a Concrete School is now maintained in Bombay in which young men from various parts of the country are trained, free of charge, in the correct methods of preparing concrete mixtures and products. This is a move of great importance both to the industry and to the country.

As an indirect means of making known to the general public the various uses of cement, the Concrete School is of considerable propaganda value. It was established, however, essentially for the purpose of training young men in the practical application of the rules laid down in the various pamphlets and text books issued by the Association. Students are mostly of the sub-overseer and maistry class and their training covers all elementary construction works such as floor finishing, plastering, colored cement work, etc., together with the manufacture of small concrete articles in every day use, such as segrees, choolas, flower pots, etc. A similar School is being opened in Madras and will be followed by others in every Presidency town. These will act as a short finishing course to the various Colleges and Engineering Schools throughout the country and while they are designed mainly for teaching the subordinate classes, the course of instruction available is of the greatest assistance to young engineers who in the early stages of their career should learn to use their hands as well as their brains.

Demonstration Lorries

Another novel method of boosting the use of cement has been tried out with very gratifying results. A number of demonstration lorries, each equipped with the necessary tool-plant and in charge of a Concrete specialist, move from place to place in their respective areas demonstrating to the public how easily and cheaply ordinary household articles of a durable quality can be prepared from Cement, and explaining to them how advantageously it can be used for all constructional purposes. This form of publicity reaches the villager in his home and helps to make him realize the invaluable uses of Cement for minor purposes and as a means of improving sanitation and cleanliness not only in his own house but in the village as a whole. In addition, the Touring Specialist discusses with the local dealer or stockist the latest methods and improvements in Concrete Construction and ascertains from him the local requirements in this respect. In this manner he comes into contact with the local Municipal P.W.D., and District Board Officers, explaining to them how every item of construction, whether it be a school, a sewer, a lamp-post, a bridge or a road, can often be built more cheaply, more enduring and more attractive by the use of Cement Concrete. Thus a twofold object is gained, on the one hand the education of the public to increase the demand for Cement, and on the other, more durable structures at less cost to public funds.

The part which the Cement industry plays in the interests of the welfare of the country is not generally appreciated. Not only does it afford employment to about 10,000 men in the factories alone, but it is one of the best customers of Indian coal, 3½ Lakh tons of which are consumed there every year. The Jute industry is also benefitted, as over 180 lakhs of jute bags are used for packing purposes. Then there is the huge freight revenue accruing to the Railways by the transport of coal, gunny bags and Cement, the latter having now reached a figure of well over a million tons per annum.

Again the Cement industry is of greater national importance than any other industry in the sense that it is the only one which can enter into every one of the four main schemes of the national program, viz., rural uplift, development of cottage industries, reduction of unemployment and proper housing of the toiling masses.

Associated with rural uplift we need only consider a good road, parapet walls and covers for wells, curbs round water springs to protect them from pollution drinking troughs and manure pits. These are some of the various items of village requirements in the provision of which Cement can be used with advantage.

The preparation of such by-products as segrees or choolas, flower pots, etc., can be developed as a cottage industry.

The greater use of Cement Concrete for roads, bridges and buildings, both public and private, affords employment to thousands of laborers and skilled supervisors throughout the country and in this way helps in reducing unemployment. In the villages, the poorer classes benefit by the introduction of better dwellings, proof against fire, damp and vermin, permanent and unshakable, improving the time and not affected by weather conditions.

To Restore Tsingtao Mills

An agreement has been reached among the Japanese spinning mills in China on the pending plan for rehabilitating the cotton spinning mills in Tsingtao, which were destroyed by Chinese troops under the command of the late General Han Fu-chu.

The following equipment is to be installed in the spinning mills at Tsingtao:

	Spindles
Spinning machines	390,500
Twisting machines	32,000
Weaving machines	7,100

The equipment corresponds to 65 per cent of that before the mills were destroyed. The fund required for the new machines is estimated at 15 million yen.

China—A Treasure Land of Raw Materials*

China is one of the largest countries in the world, its area extending to 4,000,000 square miles and the population amounting to 400-million. The country, however, is still in the early stage of economic and cultural development, having failed to keep pace with modern civilization, while administrative leaders have lacked real ability. Although the country is richly endowed with natural resources, these have not been developed. As a result the general situation in China is characterized by a strong color of feudalism, hardly going beyond the pastoral stage.

Japan, on the other hand, is short of industrial resources, being one of the "have-not" countries.

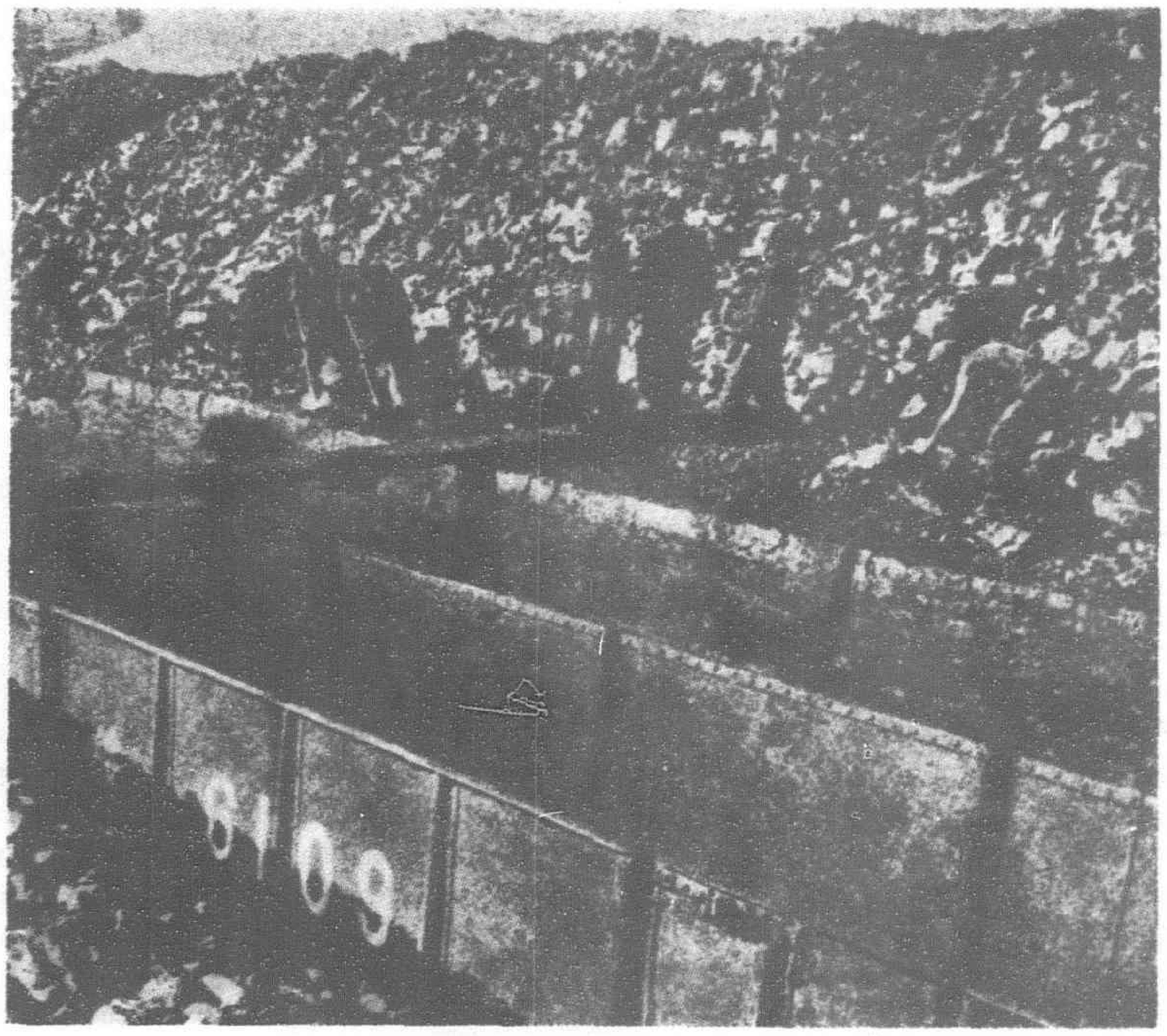
As a natural outcome of the contrasting conditions prevailing in these two countries, much has come to be expected of the operations on the industrial resources in China in the future—after the present armed conflict is ended.

As a matter of fact, the first step has already been taken for exploiting the natural resources in some parts of the occupied areas in China. So far, however, little has been accomplished, such operations having been restricted by other considerations, e.g., problems concerning traffic and communications as well as the maintenance of peace and order. Real work can only be done after lasting peace is restored between China and Japan.

Meanwhile, much is said about the industrial resources of China. And no one, at present, has any definite idea as to the actual state of affairs in that country.

Difficulties have hitherto accompanied any attempt at conducting thorough-going investigations. Many reports have been made public, but they are either incomplete or inaccurate. It is surmised, meanwhile, that there must be in China a considerable quantity of virgin resources still unknown to outside world.

This article proposes to give an outline of the natural resources in China, based on figures already made public by various quarters with reference to possibilities of what can be done about it, so that it may serve to give a rough idea as to the probabilities of the future as well as the basic terms regarding the economic development of that country.



Coal of Tatung, Shansi, being loaded in a freight car

This study is made in the light of bloc economy. That is, China is viewed as an extension of the Japanese-Manchoukuo bloc, or rather, as a link constituting the Greater Asiatic Economic Bloc.

Three Features of Resources

Viewed from the standpoint of Asiatic bloc economy, the natural resources of China are characterized by three features, viz.:

(1) The rich and diverse supply of raw materials in China will make the tripartite economic bloc, with Japan and Manchoukuo included, substantially self-sufficient in raw materials. Complete self-sufficiency in China, for that matter, is not altogether out of question, provided proper operations on the Chinese industrial resources are conducted.

(2) The supply of heavy and chemical industrial raw materials is so abundant in China that it is more than sufficient to cover the needs of Japan and Manchoukuo. If Japan were to become an influential world unit in the domain of heavy and chemical industries, China's part as a member of the Asiatic economic bloc is of vital importance.

(3) The geographical situation of China is such that it affords such a desirable footing for Japan's economic and political advance to the Asiatic continent that the development of the industrial resources in China would constitute the first step toward the establishment of the Asiatic economic bloc. China's natural resources should be exploited, not only to feed the manufacturing industries in Japan, but also to stimulate positively the establishment of key industries in China.

It is worthy of note, too, that North China assumes greater importance in the formation of the Asiatic economic bloc because it is through this section that Japan and Manchoukuo come into direct contact with China.

Japan's policy of industrial development in North China, consequently, presents different aspects from that in Central China.

A general account of the natural resources of China and the existing state of affairs of the operations thereon follows:

Coal.—Estimates on the volume of coal deposits in China vary extensively. It ranges from 21,200,000,000 tons to 996,600,000,000 tons. Irrespective of this wide difference in the estimates, it is generally believed that up to 70 per cent of the total deposits is in North China, with the largest proportion thereof in Shansi province. This fact illustrates the overwhelming importance of North China as the coal producing center.

Despite the enormous estimates of the coal deposits, the total production in China is relatively small, though here again North China is responsible for 70 per cent of the output of the country.

The Tatung coal of Shansi province is of fine quality. It has already found its way to Japan. So far, however, the volume is far from sufficient to alleviate the acute shortage of coal in Japan under the emergency requirements.

That the coal mining industry in China is still in an early stage of development is attributed to the fact that there is no major demand for it in that country as the other key industries are still in the elementary stage. Too, dumping of cheaper foreign coal on the Chinese market is affecting the industry.

There are a number of reasons why Chinese coal cannot compete with the foreign supply in China. Prominent among these are:

(1) The industry is run on a small scale as the capital and technique available are inadequate.

(2) Cost of transportation is high due mainly to the fact that communication lines are limited.

(3) The tax burden is heavy, boosting greatly the cost of production.

Iron.—There are no authentic reports on the iron deposits in China. According to the 5th Report of Iron Industry in China, however, the general distribution of the deposits appears to be as follows: (unit, 1,000 tons).

Districts	*Definite deposits*	*Estimated further deposits*	*Total*	*Percentage*
North China	141,509	33,095	174,604	54
Yangtze Valley	102,220	9,580	111,800	35
South-east Maritime districts	30,488	6,024	36,512	11
Total	274,217	48,699	322,916	100

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* From the *Osaka Mainichi*.

As is evident from the foregoing table, North China is richly favored with iron ore. The operation of iron mines there, however, is far behind that of Central and South China. The iron ore production in North China amounts only to about 200,000 tons a year, or only 14 per cent of the total output of China.

Iron mining in North China is now conducted by old-fashioned methods (That in Central and South China, also, is not highly mechanized, for that matter).

Before the outbreak of the China Emergency, the total production of iron ore in China amounted to about 1,300,000 tons a year. More than one half of this was exported to foreign countries, mainly Japan.

Hua Chung Iron Mining Co.

To stimulate iron mining in the Yangtze Valley region, the Hua Chung Iron Mining Co. was established in Shanghai, under the joint investment of China and Japan. This company is capitalized at Y.10-million. It proposes to turn out 1,000,000 tons during the first year and to increase its output to 5,000,000 tons in five years.

Much is expected of the future activities of this new concern which, by the way, is about the first Sino-Japanese company to operate on the natural resources of China in the central part of that country, under the new regime. Japan lacks iron supply. In 1936, Japan required 5,080,000 tons of iron ore, but the domestic supply in that year totaled only 1,250,000 tons, the remaining 3,830,000 tons being imported. The percentage of import against the total requirement corresponded to 75 per cent.

Of the foregoing heavy import of iron ore from abroad, the supply from China amounted to 1,250,000 tons, constituting 33 per cent of the total import and 25 per cent of the total need of Japan. The entire volume was imported from Central and South China. It is in consideration of such facts that the activities in the future of the Hua Chung Iron Mining Co. are viewed with much expectation.

As for the iron mining in North China, there are many difficulties attending the undertaking due to the lack of transportation facilities. Nevertheless, much is also expected of the development of iron mines in North China, prompted by the necessities along the national policy of Japan. North China's position as a member of the economic bloc concerning iron will rapidly grow in importance.

Petroleum.—Regarding the petroleum deposits in China, it is estimated at 1,375,000,000 barrels, or only 2.5 per cent of the entire deposits of the world, according to a survey made by an American geological institute. It is not known, however, how reliable this survey is. Moreover, it is reported that new oil fields have been discovered in Shensi and Szechuen provinces in recent years. It is, therefore, also said that the petroleum deposits in China may prove larger than believed at present.

As far as the five provinces of North China are concerned, however, not a single drop of petroleum has so far been found.

China has hitherto met her domestic petroleum needs entirely through imports.

Salt.—China has immense salt resources, the production being made at sea, and in lakes, wells, and hills. The annual output is enormous. A considerable volume is already being exported, but the production can further be increased.

Of the five provinces of North China, Shantung is the most important salt production center. Its supply is next only to Kiangsu, Kiangsi and Szechuen provinces in volume. Hopei province is also an important salt producing center in North China.

China's total production of salt amounts to 36-million piculs a year of which 30 per cent is turned out in North China. The maritime districts of Shantung and Hopei provinces yield sea salt, while Shansi and Suiyuan provinces produce lake salt. The lake salt production is much less than that of sea salt, but it covers the need in the remote inner parts of the country.

The sea salt is produced all over Shantung and Hopei provinces because of the favorable geographical and climatic conditions. It is already being shipped to Japan, known as Shantung salt and Changlu salt, through the Hsiang Chung Co.

Minerals.—The mineral deposits in China are considered to be rich in variety as well as in volume. According to investigations made by the geological department of the Industry Office of the Kuomintang government, the estimated deposits of such minerals as Manganese, Tungsten, Antimony, Aluminium, and fluor-spar ores are as follows: (Unit, 1,000 tons).

Items	*Deposits*
Manganese	22,500
Tungsten	949
Antimony	3,677
Bauxite	68,000
Alum stone	179,333
Aluminium contained in bauxite and alum stone	11,600
Fluor-spar	450

Raw Cotton.—The raw cotton production in China corresponds to ten per cent of the world total, China standing third in the world ranking of the raw cotton producing countries.

Raw cotton in China is produced mainly in the valley irrigated by the Yangtze and Huang (Yellow river). The unit-area output in the Yellow river valley (North China) is larger than that of the Yangtze valley and the output is also larger, varying from 35 to 50 per cent of the total production of all China.

Annual Cotton Crops Differ

There is a wild difference in the annual production of raw cotton in China from one year to another, depending largely on the natural conditions of the year. Generally speaking, however, both the acreage and production are on the increase. Together with the quantitative increase of production, efforts are also exercised for the qualitative improvement of the industry. There are two kinds of raw cotton in China, one from the native seed and the other from American seed. In recent years, the cultivation of the American growth is steadily increasing because this kind yields better, while the demand for the native kind is decreasing, especially in the export to Japan.

Cotton-growing is active in North China because the climate and soil conditions are favorable. The dry districts in North China resemble the cotton producing centers of the United States in climate and geographical conditions. This is another reason for the advance of cotton from American seed in this part of China.

Another important thing about the raw cotton cultivation in North China is that it is about the only agricultural product which farmers of North China may turn out as an international merchandise. In fact, the growing of cotton has a significant bearing on the relief and rehabilitation of the Chinese farmers in North China. Too, viewed from the tripartite economic bloc of Japan, Manchoukuo, and North China, the arrangements of having raw cotton cultivated in North China on a large scale to exchange for soya beans and other kinds of food products of Manchoukuo seems plausible.

There is, therefore, every reason for Japan to encourage raw cotton cultivation in North China by giving technical and economic assistance to facilitate larger production and qualitative improvement. Japan will thus be assured of the raw material supply and can incidentally help enrich the living conditions of the Chinese farmers in North China through large Japanese purchases of the cotton. Moreover, the Japanese purchase of raw cotton increases the purchasing power of these Chinese farmers in North China, which in turn helps to enlarge the market for Japanese industrial manufactures for export.

As for the inevitable wane of the cereal production in North China resulting from the concentration on raw cotton cultivation, there is Manchuria to fill the want with her abundant supply of cereals.

Wool.—Mongolia and the Yellow river districts constitute the wool production center in China, in addition to such remote regions as Tsinghai and Kansu provinces. Sheep raising is seen in such Central China provinces as Szechuen and Chekiang, but the scale is small. In the light of the tripartite economic bloc, the wool production in North China is of special importance.

The raising of sheep and goats in Manchuria and Mongolia has hitherto been going on mainly to obtain food and skins. As a result, little attention has been paid to the quality of wool. The Mongolian and Manchurian wool is generally of low grade, being stiff and lacking luster. The wool obtained in these districts has been used for weaving carpets and mixed Kashmir. Besides, it has sometimes been used to produce such thick woolen woven goods as serge.

The experiments conducted by the Kanegafuchi Cotton Spinning Co. in recent years have proved, however, that Chinese wool can be used for high-grade woolen goods. The prospects of sheep raising in North China, therefore, have become suddenly brighter, although much depends on further technical improvement.

Other Agricultural Products

Included among the principal agricultural products besides raw cotton in China are wheat and rice. In North China, one may mention wheat, barley, kaoliang, millet, corn and soya beans.

As for the live stock raising, the animals are employed to help tilling the land. Wool is about the most important raw material produced in North China for modern manufacturing industries, although a considerable volume of hides and leather is being exported as a result of raising oxen, horses, donkeys, pigs, goats, sheep, etc. Japan, too, imports a large quantity of hides and leather from China as a whole.

What should, and will, Japan do in dealing with the foregoing industrial resources of China, in the light of formation of the Asiatic economic bloc? This is a problem of which the solution can be found in the law governing the promotion and activities of the North China Development Co. and the Central China Reconstruction Co. The law was enacted during the last session of the Diet and it has subsequently been promulgated.

Salient features of the law in question include:

1. (1) The two aforementioned companies will not be directly engaged in any industrial enterprises in North and Central China. They are to function as holding companies. It is to avoid the evils of monopolizing such enterprises.
2. (2) All the industrial enterprises in which these two companies will invest, and which they will control, are designated. That is, free competition is permitted to all the rest of the industries.
3. (3) In North China, the holding company is to stimulate the development of key industries whereas in Central China the company is to invest in the recovery and expansion of public utilities and communications enterprises. There is a marked difference in the policy between the two companies, revealing that more urgent need is found in North China to make the region a link of the tripartite economic bloc.

It is also revealed by the law in question that all the industrial enterprises should be conducted by the Chinese, in principle, to develop their industrial resources, while Japan will furnish them with necessary capital and technique with proper control.

Through the medium of these two companies, Japan proposes to expedite the industrial development of North China and to assist economic rehabilitation in Central China. This difference in the business policy of these two companies has evidently resulted from the varying state of affairs in these two districts.

It is surmised that Japan proposes to utilize as much native capital as possible and also not to provoke their anti-Japanese sentiment as far as possible as is evidenced by the fact that the industrial monopoly is avoided to some extent, leaving breathing space for freedom of industrial competition.

It remains to be seen how far the Japanese government policy to form the economic bloc will succeed. One may safely say, however, that this is an appropriate one as a bloc policy, in consideration of the fact that the supply of accumulated capital in Japan is limited.

Korea's Gold Deposits

(*Continued from page 313*)

crystallized from depleted solutions in fissures far removed from the underlying parent mass of igneous magma.

Two types of mineralization may be observed :—

(1) Injections of liquid sulphides, including pyrite, galena, and sphalerite, together with gold and silver in sufficient quantity to make the sulphide bodies valuable.

(2) Deposition of gold and sulphides from hydrothermal solutions consisting of various metals and metallic sulphosalts dissolved in liquid silica.

The sulphide bodies produced by mineralization of Type 1 are generally coarsely holocrystalline. They occur as narrow lenticular masses, rarely over 12-in. in average width. The most persistent bodies are less than 100-ft. in extent along the strike of the vein, while their dimension along the pitch of the ore-shoot does not exceed 50 per cent of that figure. The lens-like deposits of gold-bearing quartz, where they attain their maximum development, have dimensions approximately double those of the sulphide bodies, indicative of their having been emplaced in a zone of lower pressure, this latter detail being further substantiated by the greater average width of the quartz bodies. The two types are often seen side by side in the same lode fissure, the second intrusion having often incorporated the sulphides to form a hybrid material almost indistinguishable from a simple, but well-mineralized, quartz vein. Examples of Type 2 exhibit a natural zoning :—

(*a*) Deepest zone—quartz containing isolated crystals of tourmaline and pyrite.

(*b*) Quartz containing dominant pyrrhotite, with pyrite and low values in gold and silver.

(*c*) Quartz with a small percentage of micro-crystalline pyrite, galena, and sphalerite ; economic values in gold.

(*d*) Quartz and coarsely-crystalline sulphides, almost barren of precious metals.

(*e*) Barren quartz.

The vertical distance of the contacts between these zones from the underlying granite is controlled by the dip of the vein fissures. The zone of maximum economic mineralization of the steeper vein system is in less-highly metamorphosed rocks than in the flatter fissures occupying shear fractures. In the former case the solutions have reached a higher horizon in the same distance travelled from the source and with equivalent opportunities for loss of heat and the inception of various stages of precipitation. The zone of maximum occurrence of sulphide injections corresponds to the first, or barren, zone of quartz mineralization, the two horizons being coincident. At higher levels, within the less-altered country rocks, the sulphides are of subsidiary importance to the vein quartz that has been mineralized with the precious metals.

Whilst the known deposits of the area have not attained the importance of ore-bodies mined for many years by the Oriental Consolidated Mining Company, at Hokuchin, and for the past decade by the Nurupi Mining Company, at Taiyudo, both in the same province, yet their characteristics are sufficiently similar to merit scientific comparison. The deposits and associated rocks in all three fields appear to be of Palæozoic age.

Japanese Boom is Predicted

"If conditions continue along the present lines a wave of prosperity should visit Japan after the end of the hostilities in China," Mr. Alexander R. Sharton, publisher and general manager of the New York *Journal of Commerce* told Tokyo Newsmen on August 27. This forecast was made after he had inspected the industrial situation following his arrival in Japan on August 20.

"I was furnished with much information by Mr. Seihin Ikeda, Minister of Finance, in my conversations with him," Mr. Sharton said. "If things go on as at present I think Japan will see a boom.

"There should be no fear of privation after the hostilities are over and financial circles have no reason to entertain pessimistic views. It may be necessary, however, for Japan to give some attention to redeeming national bonds for two years after the end of the China trouble. This should be followed by a definite boom.

"I don't think boycott movements in foreign countries against Japanese goods will assume serious proportions. There are possibilities for increases in Japan's markets and there are no indications now that markets will be reduced. It is absolutely necessary that Japan and America should continue to co-operate."

Mr Sharton is to visit Manchoukuo to inspect the economic state of affairs in various places there.

Tientsin's Asphaltic Concrete Roads*

By H. F. BARNES and C. N. JOYNER

During the past fourteen years the Public Works Department of the British Municipal Council has constructed about thirty-two miles of roadways principally in asphaltic concrete. Many inquiries have been received concerning the technique employed, and this article is an attempt to give a fairly complete picture of methods now in use. The authors make no claim to any originality, having merely adapted to prevailing conditions methods developed in other parts of the world.

Limestone is the primary aggregate used. It is obtained from Tongshan, on the Peking-Mukden Railway, in the form of heavy rubble and is reduced to the desired sizes in the stone crushing plant owned by the municipality. The sizes of stone produced are graded as follows :—

No. 1 Stone

All of which passes through a one-inch screen and is retained on a half-inch screen.

No. 2 Stone

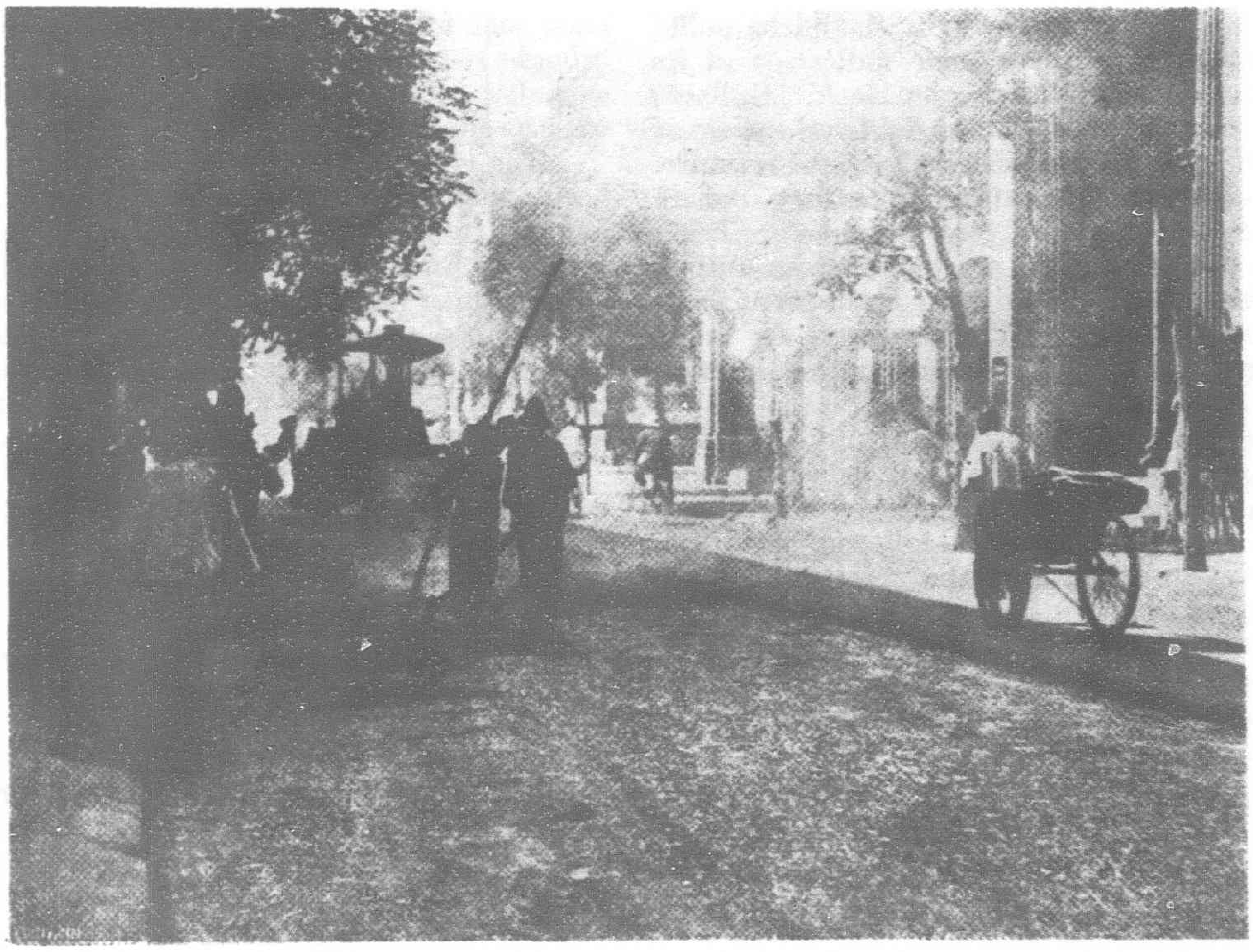
All of which passes through a half-inch screen and is retained on a ten-mesh screen.

No. 3 Stone

Stone out of the material passing the finest screens on the stone crushers and subsequently screened out with an one-eighth inch screen. All passes a quarter-inch screen and is retained on a thirty-mesh screen.

Stone Dust

All of the limestone material passing the thirty-mesh screen. Following these sizes of stones are two grades of sand, defined as :—



Victoria Road, Tientsin, between Ewo and Pao Shun Roads, showing the reconstruction of Asphaltic Concrete in 1932

"Coarse Sand"

Sand, at least 95 per cent of which passes a one-eighth inch sieve and at least 90 per cent of which is retained on a forty-eight mesh sieve.

"Fine Sand"

Sand, practically all of which passes a twenty-eight mesh sieve and practically all of which is retained on a two hundred mesh sieve.

The final size of mineral filler is in the form of Portland Cement. These materials are mixed in such proportions as will give a compact and stable whole and are cemented together with asphalt, which is required to meet the following specifications :—

Asphalt Specifications

(1) The asphalt cement must be homogeneous and free from water. It must conform to the following requirements :

(*a*) Penetration at 25° C. (77° F.), 100 g., 5 sec., 50 to 60.

(*b*) Flash point (open cup), not less than 175° C. (347° F.).

(*c*) Loss on heating at 163° C. (325° F.) 50 g., 5 hr., not more than two per cent.

Penetration at 25° C. (77° F.), 100 g., 5 sec., of residue after heating at 163° C. (325° F.) as compared with penetration of asphalt cement before heating, not less than 60 per cent.

(*d*) Ductility at 25° C. (77° F.), not less than 30 cm.

(*e*) Proportion of bitumen soluble in carbon tetrachloride, not less than 99 per cent.

(2) The properties enumerated in these specifications are determined in accordance with the following methods of test of the American Society for Testing Materials :

(*a*) Penetration : Standard Method or Test for Penetration of Bituminous Materials (A.S.T.M. Designation : D 5).

(*b*) Flash Point : Standard Method of Test for Flash and Fire Points by Means of Open Cup (A.S.T.M. Designation : D 92).

(*c*) Loss on Heating : Standard Method of Test for Loss on Heating of Oil and Asphaltic Compounds (A.S.T.M. Designation : D 6).

(*d*) Ductility : Standard Method of Test for Ductility of Bituminous Materials (A.S.T.M. Designation : D 113).

(*e*) Proportion of Bitumen Soluble in Carbon Tetrachloride : Standard Method of Test for the Determination of Proportion of Bitumen Soluble in Carbon Tetrachloride (A.S.T.M. Designation : D 165).

The mixture now being used, and which has been found to give good service, is as follows for a batch of 1,020 pounds and a volume of 8.5 cu. ft. The weights given are exact ; the volumes are close approximations.

	Per cent (by weight)	*Weight in Pounds*	*Pounds per cu. ft.*	*Volume (cu. ft.)*
No. 1 Stone	26.5	270.3	85.5	3.16
No. 2 Stone	27.0	275.4	89.0	3.08
No. 3 Stone	5.5	56.1	84.0	0.67
Coarse Sand	15.5	158.1	96.0	1.65
Fine Sand	10.0	102.0	89.0	1.15
Portland Cement ..	9.0	91.8	84.0	1.09
Asphaltum (melted) ..	6.5	66.3	61.02	1.09
Total Asphaltic Concrete.. ..	100.0	1,020.0		8.5

It is apparent that the volume of the asphaltic concrete when mixed will be considerably less than the sum of the volumes of the ingredients of which it is composed, on account of the fact that when the latter are mixed together the finer particles go to fill the voids between the larger pieces. This filling of the voids is, of course, the criterion in designing such a mixture.

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*From the *Journal of the Association of Chinese and American Engineers*

Temperature—The asphalt and mineral aggregates are heated separately to temperatures of between 325° F. and 350° F.

The stone and sand are first heated to the required temperature, mixed together for 20 seconds, and then the cold filler (Portland Cement) added. After this the hot asphalt is added to the mixture and the mixing continued, within the temperature limits specified above, until every particle of the mineral aggregate is thoroughly covered with the asphalt. In any case the mixing is continued after all the ingredients, including the hot asphaltum, have been put into the mixer, for a period of at least three minutes.

On no account is the temperature of the mixture or of any of its ingredients, allowed at any time to go higher than 375°, on account of danger of burning the asphalt. The mixture leaves the machine at between 275° and 325° F.

Consistency of Mixture

It passes directly into motor trucks where the mixture should "crawl" slowly down the sides of the heaps in which it is deposited; should it be too stiff to do so it indicates either a shortage of asphalt or too much Portland Cement or other fine material in the mixture. On the other hand it should not settle down quickly into a level "sloppy" load with free asphalt on top, an indication of too much asphalt or too little fine material in the mixture. Free asphalt may also indicate overheating or burning.

Besides the reading shown on the thermometer (and, every batch is tested with an armored thermometer) it should be noted that the appearance of the mixture gives some indication of its temperature. In color it should be a glistening jet black. Dullness in color, particularly a brownish black, indicates overheating or burning which is also shown by bluish fumes rising from the mixture.

The Municipality maintains a testing laboratory where materials, particularly asphalt and cement, are tested before being purchased and where each day during the working season samples of asphaltic concrete are broken down into their constituent parts and the percentages present determined. These samples are taken from the motor trucks immediately after mixing as well as from the roadside.

The samples on arrival at the laboratory are put through a machine similar in principle to a coffee percolator, where carbon-bisulphide dissolves out the asphalt. The percentages of materials found to be present are compared with the following standard grading and if discrepancies are discovered the necessary adjustments are made at the mixing plants. In addition to this control a record is kept of the temperature of the material in each vehicle, the time it leaves the plant, the time the vehicle returns to the plant, and the temperature of the material as delivered on the road being constructed.

Laying Asphaltic Concrete

Before laying asphaltic concrete care is taken, not only that all sewers have been constructed in that portion of the road which is to be laid, but also that all house-connections and street-pot gully connections to such sewers have been put in.

If the foundation is of brick it is thoroughly rolled and consolidated with a 10-ton steam roller, so as to make sure that no subsequent settlement will take place, before the asphaltic concrete is laid on top of it. The asphaltic concrete is carried from the mixing plant to the road where it is to be used in motor trucks, the mixture being covered, while in transit, with tarpaulins, matting, or other suitable material to retain the heat. It must arrive on the job at a temperature of not less than 250° F. nor more than 350° F. Any arriving at a lower temperature is immediately reported to the mixing-plant manager. It between 250° F. and 240° F. it is used but if below 240° F. it is rejected.

A record giving the number of each vehicle carrying asphaltic concrete, time of arrival on and departure from the job on each trip, together with temperature of each load on arrival, is kept and a copy sent in to the Municipal Engineer every night.

The prepared base or foundation is cleaned of all loose or foreign materials and thoroughly dried before any asphaltic concrete is laid upon it. The asphaltic concrete is dumped into piles from the motor trucks on a steel drag-plate outside of the space where it is to be spread and immediately distributed evenly into place with hot shovels in a uniformly loose layer of correct depth. The piles are shoveled from the bottom and the mix deposited on the road by turning the shovel completely over. Where the asphaltic concrete is to come into contact with surfaces of drain stones, manhole covers, etc., such surfaces are painted with hot liquid asphalt before the asphaltic concrete is laid against them. Along these edges the asphaltic concrete is made thicker so that, on completion, it will be about ¼ inch above the edges of the manhole, or drain stone.

The asphaltic concrete is laid in two successive layers of equal thickness. Each layer is two inches thick when loose and is consolidated by rolling to one and half inches so that the completed thickness of the asphaltic concrete is three inches. It must be laid both to camber and to grade. This can only be done by using both camber boards and straight edges. One-half width of a road is done at one time, the other half being kept open to traffic.

First of all a plank three inches thick is staked longitudinally along the roadway with its inner edge just along the center line of the carriageway. It is spiked firmly in position ; on top of it a board one inch thick is laid resting loosely, along its full length also on top of the drain stone a one-inch board is placed longitudinally, with a lath one-quarter inch thick laid loosely on top of it.

A camber board is then placed (cut off at each end so that the "cambered" edge projects downwards two inches), one end resting on the lath at the drain stone, the other on the one-inch board at the center of the road. The camber is usually one in forty. With the camber boards resting as above described, the asphaltic concrete is filled in loosely between them and by dragging the camber boards back and forth in a direction parallel to the length of the road brought to grade and camber at all points. We then have a layer of asphaltic concrete, the width of half the street, two inches thick, with its top surface correct to camber and grade.

The lower layer is now rolled as described later on until it has been compressed one-half inch, that is until its thickness has been reduced from two inches (loose) to one and one half inches (after rolling). Immediately after this, and while the lower layer is still hot the upper layer is laid two inches thick (loose) in the same manner as described above for the lower layer, except that, in this case the cambered edge does not project downwards but the ends of the camber slide along on top of the one-inch board and the quarter-inch lath, and the upper layer is thus brought to grade and camber.

This upper layer is now ready for rolling. Before starting to roll, the inch board from under the quarter-inch lath at the drain stone, and the one-inch board from on top of the three-inch plank in the center of the road are removed.

The Finished Trade

Now, after removing the camber boards, the asphaltic concrete is rolled, until it has been compressed one-half inch, that is until it will just touch the lower edges of camber boards when these are again applied, the camber boards resting with one end on the three-inch plank in the center of the road, the other end resting on the quarter-inch lath, the lath itself resting directly upon the drain stone. This will give the finished grade and camber of the roadway.

During the earlier stages of the rolling the camber is continually tried with the camber boards, any marked depressions in the surface being filled with fresh asphaltic concrete, long-handled shovels being used, where necessary, for this purpose. Great care is taken that coolies do not walk over the fresh or soft mixture, under any circumstances. When a handroller is used the ropes employed for pulling it are long enough to pull the roller back and forth across one half the width of roadway without coolies walking on the new asphaltic concrete. The rope must be looped around the handles of the roller to keep them from scraping the soft surface or the hot rollers may be equipped with long handles. The first rolling is always from the drain stone towards the center line of the road, rolling at right angles to the curb line.

Each succeeding weight of roller is employed to do rolling in three directions, always in the following order: First, at right angles to the direction of the road, beginning from the drain stone, as above. Second, diagonally to the direction of the road, at an angle of forty-five degrees with line of the curb ; starting at the drain stone and rolling up to the center line of the road. There are two sets of diagonal rolling each at forty-five degrees with the line of the curb and crossing one another at right angles. Third, longitudinally to the direction of road, parallel to the line of curb, the first strip being next the drain stone and progressing, in parallel strips ; up to the center line of the road.

The above order of rollings (first right-angles, then two diagonals, finally longitudinal rolling) is most strictly adhered to in all cases, otherwise there are sure to be " road surface waves " formed in the surface of the asphaltic concrete.

The first weight of roller used is a hot hand-roller weighing 600 lb. per lineal foot, and all the above systems of rolling (right angles, diagonal and longitudinal) are carried out with it and the same systems of rolling, in the same order, by each succeeding weight of roller. After the hand-roller is finished a steam-roller of ten tons is employed. The first rollings with it always being done by the ten-ton roller backing onto the asphaltic concrete so that the narrow wheels pass over it before the roller. This is to compress the asphaltic concrete to as great a depth as possible. After this the final rolling is done by a tandem seven-ton roller.

Portions of the road-surface which are in positions where they cannot be rolled are thoroughly rammed with hot iron tampers (weighing 20 lb.) and the surface then smoothed with hot smoothing irons, care being taken not to burn the surface. Tools employed on the work, shovels, tamping ton irons and smoothing irons are kept hot. While waiting for a new load to arrive the tools are kept in a fire. Tamping irons are always kept moving to and fro when in use. Neither tamping nor smoothing irons are permitted to rest for any appreciable time on the surface of the asphaltic concrete in any one spot on account of the danger of burning the asphalt.

Rolling Started Immediately

The rolling of every part of the asphaltic concrete is started immediately it will support the weight of the roller without displacement, and continues for several hours. Each trip of the rollers overlaps the preceding one. The roller proceeds slowly and alternate trips are of slightly different length to prevent wave deformation of the surface. Rolling is conducted as continuously as possible to prevent the unnecessary formation of joints. No more of the lower layer is laid in any one day than can be covered with the upper layer in that same day. Rolling is continued until all roller marks are eliminated. The motion of the roller is at all times slow enough to avoid displacements of the hot mixture and any displacements occurring as a result of changing the direction of the roller, or from any other cause, are immediately corrected, with fresh mixture if necessary. Rolling proceeds at an average rate of not more than 200 square yards per hour for each heavy roller, and continues until maximum compression has been obtained.

The time required for the asphalt surface to cool sufficiently so that it can bear the weight of the roller depends upon conditions, and can only be obtained by experiment. The first rolling, with hand-rollers, takes twenty to thirty minutes, after this it is sometimes necessary to wait an hour before putting on the heaviest roller. During all stages of rolling, with all of the different weights of roller it is necessary to apply camber boards and straight-edges frequently to see that the surface is being kept true to camber and grade ; any depressions which occur being filled immediately with fresh asphaltic concrete (from another batch) and the rolling continued over it as before.

Joints—When the last load for the day is being rolled a rough joint (right angles to the direction of the road) is left. This joint tapers down from the full thickness of the asphaltic concrete to a feather edge in about two feet. Before joining on the first load of asphaltic concrete, on the following morning, the joint should first be swept clean and then painted with hot (375° F) asphalt.

When one-half the width of road has been laid and it is desired to proceed with laying the other half the vertical edge is first painted with hot asphaltum and the new material when laid along side, tamped hard with hot tampers.

As soon as possible after the rolling is completed a sealing coat of hot sheet asphalt is spread evenly over the surface of the asphaltic concrete and rolled with the seven-ton tandem roller.

Sheet Asphalt

Ingredients for one batch of 1,020 lb. are as follows. Weights given are exact. Volumes are a close approximations.

Ingredients	*Per cent (by weight)*	*Weight (in pounds)*	*Pounds (per cu.ft.)*	*Volume (in cu.ft.)*
Fine Sand	31	316.20	89	3.55
Stone Dust (which has passed through screen driven by a 3 h.p. motor)	42.5	433.50	90.75	4.78
Portland Cement (loose) ..	15.5	158.10	84	1.88
Asphaltum (melted)	11	112.10	61.01	1.84
Totals	100.0%	1,020.00		8½ (approx.)

Asphaltum similar to that used in asphaltic concrete (45 to 55 penetration) is employed. Sheet asphalt is mixed and laid in exactly the same manner as asphaltic concrete.

The sheet asphalt laid as a sealing coat is a mere sprinkling, not more than one-quarter inch thick, spread on top of the asphaltic concrete while the latter is still hot, brought to camber with camber boards and hot roller and then rolled with the tandem roller, rolling longitudinally. It is not necessary to roll the sealing coat of sheet asphalt with a ten-ton roller and the diagonal rolling is also dispensed with. After twelve hours the new roadway is opened to traffic.

Japanese Shipping Developments

SEVERAL developments of important nature have been witnessed in shipping circles of Japan recently. One of them is an agreement reached among the Nippon Yusen Kaisha, the Osaka Shosen Kaisha and the Nisshin Steamship Company in connection with the last named company's plans for the augmentation of its personnel, construction of new ships and various other aggressive measures to bolster its position as the pivotal factor in the proposed organization of a national shipping company in China. The agreement includes the following points :

(1) Each of the Nippon Yusen Kaisha and the Osaka Shosen Kaisha shall lend 16 or 17 members of its staff to the Nisshin Steamship Company to take care of the affairs of the latter for the time being.

(2) The Nippon Yusen Kaisha and the Osaka Shosen Kaisha shall guarantee payment of the proposed loan of Y.9,000,000 which the Nisshin Steamship Company will acquire from the Industrial Bank of Japan to finance the construction of four 3,500-ton class new ships. Moreover, both the N.Y.K. and O.S.K. will postpone their building plans, so that construction of ships of the Nisshin Steamship Company may be accelerated.

(3) The Nippon Yusen Kaisha shall lend its *Chikugo Maru* (2,500 tons) and the *Osumi Maru* of the Kinkai Yusen (1,300 tons) to the Nisshin Steamship Company on a temporary basis. The O.S.K. will also offer four small-size ships.

In the meantime, Shozo Murata, president of the O.S.K., who recently took the chairmanship of the board of directors of the Nisshin Steamship Company, due to ill-health of President Hori of the company, is expected to submit his expert views to competent officials of the Government regarding the shipping policy in China, on his return from Shanghai, where he is staying now.

Another important development is the increasing complaints in trade circles against ineffective operation of the autonomous shipping control device. Shipowners and operators in Japan have been attempting to control the shipping business on an autonomous basis, ever since the outbreak of the present China Incident, and this policy was reapproved by the Expert Committee of the Ship Control Commission at its meeting in August.

Engineering Notes

RAILWAYS

NORTH CHINA TRAFFIC CO.—Preparations are in progress in Peking for the establishment of the North China Traffic Company in accordance with the original plans drafted by the Peking authorities and the Japanese Central Government. A definite plan for the projected firm will be drawn up immediately after the North China Development Company is inaugurated in November this year.

NEW RAILWAY STATION.—The General Directorate of Railways in Mukden has decided to establish three second-class stations for the convenience of travellers, to open from August 15. The new stations will be as follow:

Laku, between Hailin and Mutankiang on the Harbin-Suifenho line, 343.68 kilometers from Harbin. Sanwangkou, between Hsilinho and Hsiaosuifen on the same line, 511.11 kilometers from Harbin. Pachow, between Ilaha and Haoshan on the Ningnien-Moerhken line, 143.59 kilometers from Ningnien.

INDUSTRIAL

PLAN IRON, STEEL FIRM.—Comprising 10,000 medium and minor iron and steel manufacturers in Osaka, the Medium and Minor Iron and Steel Manufacturing Company with capital of some 50 million yen will be established by Iron and Steel Patriotic Association. The projected firm, keeping close relations with the Government, from which it will borrow funds at low interest, will play an important rôle in the supervision of iron and steel manufactures and the smooth distribution of products.

NEW INDUSTRIAL CO.—Playing an important rôle in taking charge of staple produce trade between Chosen and North China, the East Asiatic Industry Company will shortly be organized on capital of two million yen supported by the Chosen Government-General, the special mission of the Japanese Army Headquarters in North China and the Chosen Trade Federation. With its headquarters in Peking, the projected corporation will have branches in Tientsin, Keijo and other principal cities in North China, aiming not only at promotion of trade between the two countries but guidance in the occupation of Koreans in North China.

CEMENT FIRM TO OPEN.—The North China Cement Manufacturing Company, whose establishment the Department of Commerce and Industry has been considering with investment by the Federation of Cement Industry and the general public will be inaugurated towards the end of August with capital of ten million yuan, in compliance with the request made by the concerns interested in North China. With its headquarters in Peking, the projected firm, a half of whose capital will be paid up, will either purchase the Chihsin Cement Company or place the latter's plants in Tsinan and the Taiyuan plants of the Hsipei Cement Company under its management in the form of Sino-Japanese joint investment. In addition the firm will erect plants in various cities in North China. Cement output by the proposed corporation will reach one million tons annually after a few years.

SERICULTURE ASSOCIATION.—With the development of the situation in Central China, the Central China Sericultural Association, which was organized on capital of three million yuan as an urgent measure to revive the silk-raising industry and which is to manage silk plants and produce and sell cocoons. Keeping pace with the silk-raising industry in Japan in accordance with the principle of economic co-operation between Japan and China, will be reorganized into a corporation under Sino-Japanese joint investment. The inaugural meeting of the projected firm was held in Shanghai on August 10. The new corporation, being named the Central China Sericulture Company, will be capitalized at eight million yuan for the time being. The company's capital is expected to be increased by two million yuan in March next year to 10 million.

AMMONIA PLANT PLANNED.—Arrangements are being made for establishing a sulphate of ammonia manufacturing corporation by the Manchoukuo Government in co-operation with the Nippon Industry Association and the National Federation of Purchasing Organization. It is understood that Hulutao has been informally selected as the site for the projected plants due to the fact that it has the Fuhsin Coal Mines in the rear and it will become an influential open port in Manchoukuo. The projected sulphate of ammonia manufacturing firm, which, it is reported, will amalgamate in the future with the Manchuria Chemical Industry Company, is to become a Manchoukuo corporation, guaranteed a six per cent dividend per annum by the Manchoukuo Government. Machines for the plants, even though no agreement has been reached, will be imported from Germany in exchange for soya been exports from Manchoukuo, it is reported.

JAPAN PULP PLANTS.—For the purpose of promoting industrial development in farm villages in Japan, the Department of Agriculture and Forestry has decided to erect simple pulp plants at 33 villages next year, for producing pulp for Japanese paper manufacture. The projected plants will be managed by the Industry Association, while construction expenditure amounting to Y.20,000 for each plant will be subsidized to the extent of Y.10,000 by the said Department. Each of the plants will produce 270 tons of pulp annually from waste timber from the saw mills.

CHEMICAL CO. STARTS IN FULL.—The Weihsin (Restoration) Chemical Industry Company, capitalized at two million yuan, of which 700,000 yuan is paid up, is to open business this fall as its plant in the suburb of Tientsin has now had its machinery installed.

The plant will produce 240,000 kin of lead sulphide and 2,800 tons of soda sulphide annually and all products will be marketed by the Mitsubishi Company in Tientsin as the sole agent. It is understood that the plant is planning to produce chlorine sulphide in future, in order to meet the demand from Chinese dealers.

THREE SODA FACTORIES.—Completing the first stage plan for producing 60,000 tons annually, the Manchuria Soda Industry Company has decided to put into operation a plan for producing 200 tons daily from the middle part of this month. In view of the increasing demand of late for chlorine and caustic soda along with the execution of plans for increasing pulp production in Manchoukuo, the same company is planning to establish factories in Kaiyuan, Mukden, and Tumen for the production of chlorine and chlorine products by electrolysis.

The projected factory in Kaiyuan is expected to produce 5,000 tons annually with the purpose of supplying its products to the Manchuria Beanhusk Pulp Company, while the output of the Mukden factory which is expected to amount to 2,300 tons per year will be sold in the general market and some 2,600 tons from the Tumen factory will be used by pulp factories in that district. Besides, in order to supply the Kwangteh Reed Pulp Company, the establishment of a factory in Yingkou is also being contemplated.

AVIATION

CHINA AIR LINES.—Beginning from August 10, the Japan Air Transport Company inaugurated two regular air routes between Japan and China, one from Tokyo to Nanking via Shanghai and the other from Tokyo to Peking via Tsingtao and Tientsin. For the time being, five large-size passenger planes capable of carrying a crew of three and ten passengers each are commissioned on these two international routes. These planes, which can develop an average speed of 374 kilometers with a top speed of 421 kilometers per hour, have just been assembled.

By October, it was further announced by the Company, three machines are expected to be delivered from America and assigned to the Sino-Japanese air services. Each of these planes can carry a crew of three and 24 passengers, it was indicated.

SHIPPING

SHANGHAI RIVER CO.—The inaugural meeting of the Shanghai Inland River Navigation Company was held at the Japanese Club in Shanghai, July 28, attended by Mr. Liang Hung-chi, head of the Executive Commission of the Restoration Government, Major-General Harada, Rear-Admiral Nomura, Mr. Shinrokuro Hidaka, Japanese Consul-General in Shanghai, and other government officials and public. Rear-Admiral Nomura's speech was followed by a general meeting in which all legal procedure necessary to establish the company were completed.

MODERN VESSELS.—A notable transaction in the history of British shipping interests in the Far East was completed August 5 by the purchase by the Indo-China Steam Navigation Company of the steamer *Haiheng*, which is one of the four fast modern ships built in the United Kingdom with money supplied by the Boxer Indemnity Fund. These four ships form the nucleus of China's modern merchant marine.

Reuter understands that the other three ships will also be purchased by the same company in the near future. All the four ships, which previously were operated by the China Merchants Steam Navigation Company, have been tied up in the Hongkong harbor since the commencement of the war.

The purchase of the *Haiheng* coincides with engine trials of an ultramodern coastal steamer, which has just been completed by the Hongkong and Whampao Dock Company for the Indo-China Steam Navigation Company. Another ship, which is being built for the same company, will be completed here next month.